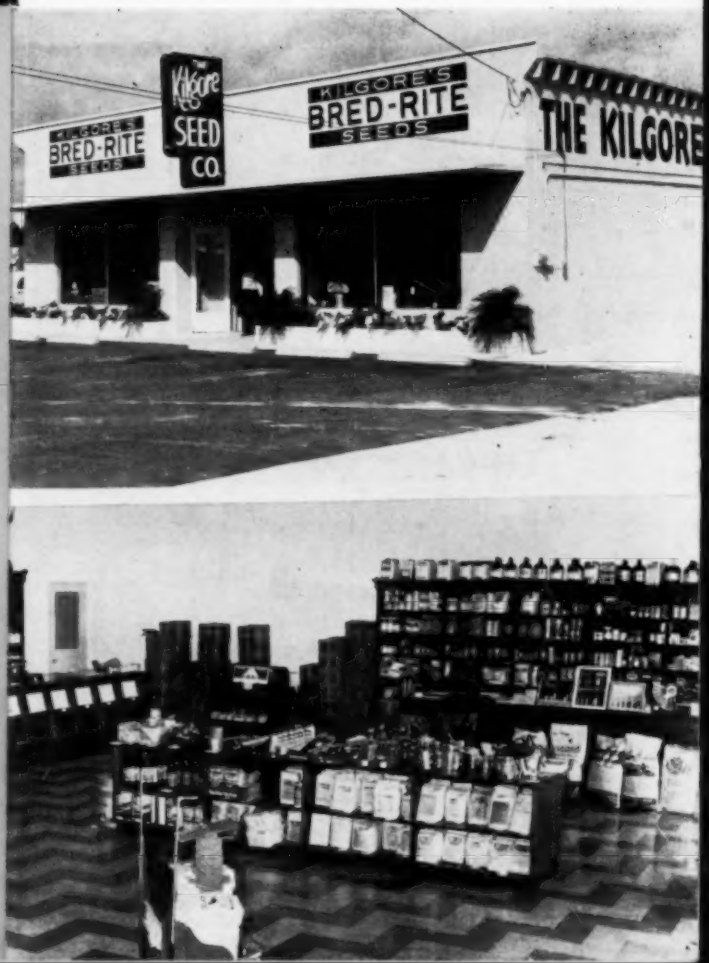
AGRICULTURAL *Chemicals*

IN THIS ISSUE:

- Granulating 3-2-2
- Microbial Pesticides
- Herbicide Emulsifiers
- Ammoniation Rates
- Liquid Fertilizers
- Flow Meters
- What Should the Dealer Know About Insecticides?



MAY, 1959

what's your E.Q.?*

QUESTIONS

	True	False
1. Inorganic salts are frequently added to oil-water systems to break emulsions.	☐	☐
2. It is impossible to prepare practical emulsions in which the aqueous phase contains high concentrations of inorganic salts.	☐	☐
3. Good agricultural emulsifiers may be characterized as individual specific chemical compounds.	☐	☐
4. The anionic components of an agricultural emulsifier impart improved performance in soft water.	☐	☐
5. A good emulsifier can be fully characterized by the ratio of anionic to nonionic components.	☐	☐
6. The active ingredient content of an emulsifier is the chief criterion of its efficiency.	☐	☐
7. Variations in toxicant, solvent and waters require adjustments in emulsifier blend for optimum performance.	☐	☐
8. The ratio of the emulsifiers in a matched pair need not be altered when the concentrate is used at high or low dilution rates.	☐	☐
9. In general, it is safer to formulate slightly higher on the nonionic side than on the anionic side when employing matched pairs.	☐	☐
10. Most formulators use the correct amount of emulsifier in their emulsifiable concentrates.	☐	☐

*Emulsifier Quality

ANSWERS

1. True. Most emulsifiers "salt out" in the presence of inorganic salts which impairs their function and breaks the emulsion.
2. False. Emcols H-A, H-B and H-C are used to emulsify insecticides in concentrated mixed fertilizer solutions in which the salt concentration may approach saturation. These emulsifiers have a unique tolerance to high salt concentrations.
3. False. Most efficient agricultural emulsifiers are blends of several anionic and nonionic surfactants.
4. True, if properly balanced with nonionic components. Conversely, the nonionic components of such an emulsifier impart improved performance in hard water.
5. False. It is not sufficient to balance the anionic-nonionic ratio. Since both anionic and nonionic components have hydrophilic and lipophilic properties, each in turn must be properly balanced to obtain maximum efficiency at the minimum use level. This requires blending several components, in some cases as many as 12 different surfactants.
6. False. The composition of the separate components and their balance is the prime consideration.
7. True. This is achieved most conveniently by the use of matched pairs of emulsifiers.
8. False. The rate of dilution required by the particular field application affects the blend of the matched pair necessary for optimum performance.
9. True. An excess of nonionic may result in excessive creaming which can easily be redispersed, but an excess of anionic may result in a tendency toward oil separation.
10. Only you can answer this. If you are using Emcols, you are saving money because they can be used at low use levels and give outstanding aging stability. Low moisture content, the rigidly controlled components, and Emcol know-how allow you to manufacture superior concentrates at competitive prices.

SCORING: If most of your answers were correct, you definitely have emulsifier "know-how." And most formulators with "know-how" look to Witco's Emulsol Products for leadership in the field of emulsifiers for the pesticide industry. This leadership is based on continued **research** into new problems which arise such as liquid-pesticide, liquid fertilizer formulations...on rigid **control of production** by an outstanding staff of chemists...on **technical service** to help you with your particular problems.

Send for Witco's Manual on "Pesticide Formulation" describing the Emulsol Emulsifiers for the agricultural industry.

EMULSOL

EMULSIFIERS

Products of

WITCO CHEMICAL CO., INC.

122 East 42nd Street

New York 17, N. Y.

Chicago • Boston • Akron • Atlanta • Houston • Los Angeles • San Francisco

Statement of Fact

POTASH COMPANY OF AMERICA

Our only business is **Potash**. Therefore, our only interest is to produce the best Potash on the market and to render the users of Potash the best of service in the delivery of our Potash. Call on us for your spring requirements.

New 60% Standard Muriate
New 60% Special Granular Muriate
New 60% Coarse Granular Muriate
Sulphate of Potash
Chemical Muriate — 99.9% KCL minimum

Quick Service — High Quality
Phone, write, telex, or wire us.
Phone STerling 3-4990, Washington
TWX No. — WA—331.

POTASH COMPANY OF AMERICA

CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

More uniform blends... **5 TONS AT A TIME!**

The biggest blender ever designed exclusively for dry-mixing botanical pesticides!

Most efficient too! Engineering innovations enable this unique 5-ton capacity blender to produce mixtures that are completely uniform . . . bag after bag!

Installed to meet increasing demand for uniform products, this new Penick facility assures better quality than ever before — at no increase in cost to you.

PENICK

Farm Chemical and Insecticide Division

S. B. PENICK & COMPANY • 100 CHURCH ST., NEW YORK 8 • 735 W. DIVISION ST., CHICAGO 10

This Month's Cover

Front view of retail sales area of Kilgore Seed Store, Pompano Beach, Fla. Lower photo shows retail sales display area. See story on pages 32-34.

Publisher
Wayne E. Dorland

Editor
Eleonore Kanar

Associate Editor
Richard D. McNally

Advertising Manager
Ralph Dorland

District Managers
Roger Appleby
William Ryan

Circulation Manager
David Tryon

MEMBER AUDIT BUREAU OF CIRCULATIONS

Vol. 14, No. 5 May, 1959

AGRICULTURAL *Chemicals*

ARTICLES

THE KILGORE SEED CO. 32
GRANULATION OF A 3-2-2 RATIO FERTILIZER 35
By Elmer Perrine
MICROBIAL PEST CONTROL 37
EMULSIFICATION OF HERBICIDES 38
By J. W. Van Valkenburg and J. A. Kelly
LIQUID FERTILIZERS 41
By Samuel R. Aldrich
AMMONIATION RATES 42
By W. W. Harwood
WHAT SHOULD THE DEALER KNOW ABOUT INSECTICIDES? 44
By Donald Frear
MEASURING FLOW OF LIQUID FERTILIZER MATERIALS 47
By W. E. Jones, Part 2 by A. Brehler
ROADSIDE WEED CONTROL 53
By E. P. Sylwester
MERCEDES DUSTING SERVICE 54
By Lloyd P. Nolen

FEATURES

IN THE SPOTLIGHT THIS MONTH 8
INDUSTRIAL CALENDAR 26
EDITORIAL 31
FERTILIZER VIEWS AND NEWS 50
By Vincent Sauchelli
THE AGRICULTURAL APPLICATOR 51
PEST ROUNDUP 65
By Kelvin Dorward
THE LISTENING POST 71
By Paul Miller
WASHINGTON REPORT 74
By Donald Lerch
INDUSTRY NEWS 79
PROFESSIONAL DIRECTORY 107
CLASSIFIED ADVERTISING 107
ADVERTISERS INDEX 109
TALE ENDS 110

PUBLISHED monthly on the 1st, by Industry Publications, Inc.

ADVERTISING and Editorial Office, P. O. Box 31, Caldwell, New Jersey.

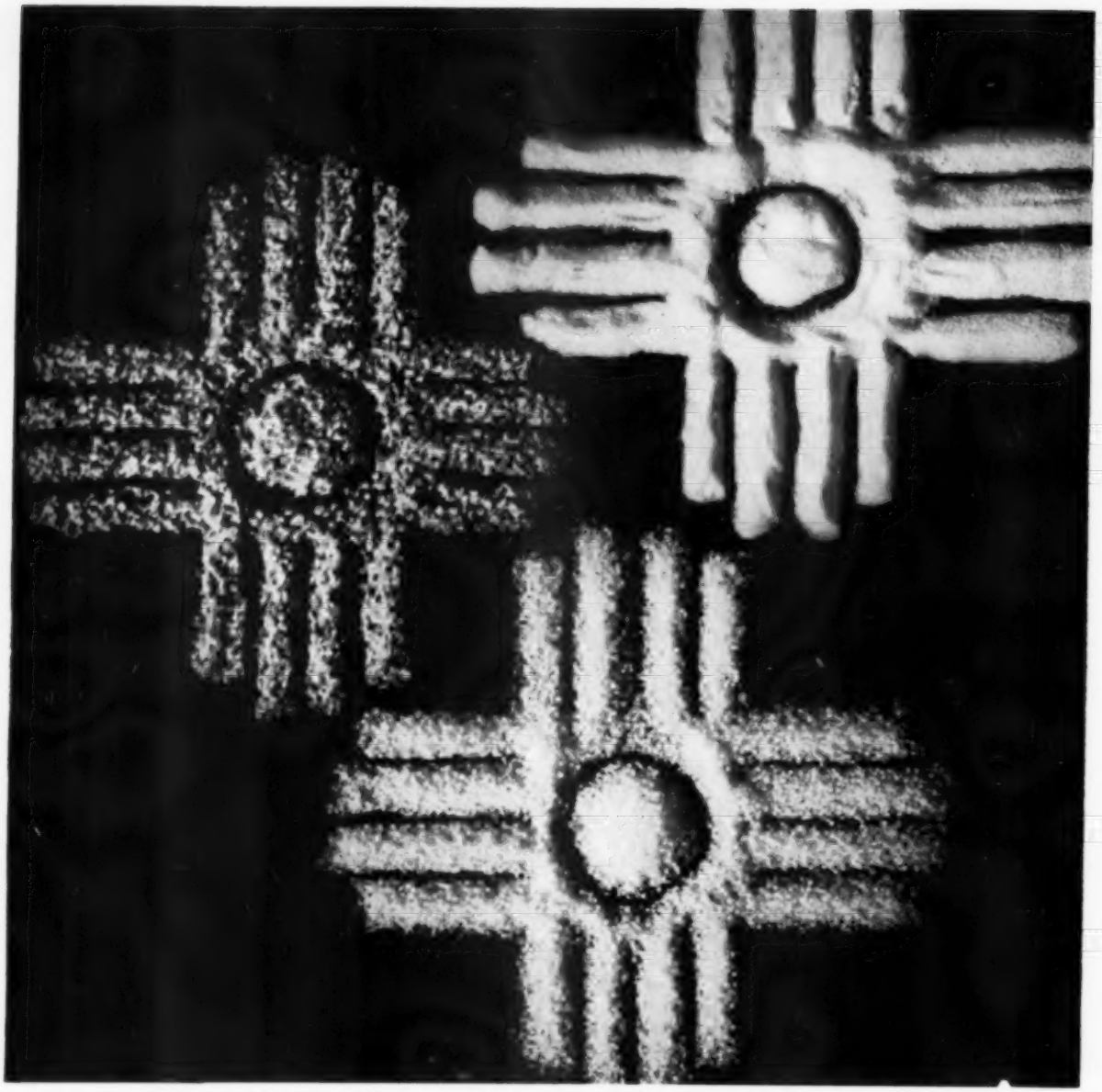
PUBLICATION Office: 123 Market Pl., Baltimore, Md.

ENTERED as second-class matter November 4, 1949 at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

SUBSCRIPTION RATES: United States, 1 year, $3.00; 2 years, $5.00. Canada and Pan American countries, 1 year, $4.00; 2 years, $7.00. All other foreign countries, 1 year, $9.00; 2 years, $15.

SINGLE COPIES: current issue: $0.50; all back numbers $1.00. Postage and handling charges for foreign countries on single copies: $1.00. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing. No claims allowed from subscribers arising from failure to notify the Circulation department of a change of address, or because a copy is "missing from files."

ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.



Better fertilizers begin with three top quality grades of USP potash

For the manufacture of all modern fertilizers, USP offers *three* outstanding grades of potash: two white grades—Higrade muriate and Higrade Granular muriate—each containing 62/63% K_2O, and each specially sized to meet current fertilizer manufacturing requirements. These white muriates give you the most potash per ton for mixed fertilizers. And USP's Granular muriate, containing 60% K_2O, is ideally suited for fertilizer uses requiring a still larger particle size. All three grades resist caking and remain free-flowing for easy storing and handling.

For complete technical data and shipping information, contact the United States Potash Company. Our expertly staffed Technical Service Department welcomes your inquiries.

UNITED STATES POTASH COMPANY
DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION
50 Rockefeller Plaza, New York 20, New York
Southern Sales Office: Rhodes-Haverty Building, Atlanta, Georgia

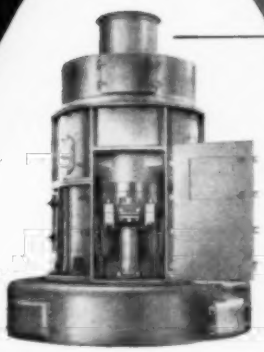
UNITED STATES POTASH · PRODUCT OF NEW MEXICO U.S.A.

MEMBER: AMERICAN POTASH INSTITUTE

REG. U.S. PAT. OFF.

LOOKING FOR A FINE GRIND WITHOUT INVOLVED MAINTENANCE PROBLEMS?

Then you're looking for a Bradley Pneumatic Hercules Mill. Because the Bradley Pneumatic Mill is installed on a foundation flush with the floor line, it not only reduces foundation costs but simplifies inspection and maintenance. Grinding parts are also easily accessible . . . both grinding die ring and roll assemblies can be removed without dismantling the mill. And the mill's durable, nonclogging vibratory feeder and electrical control eliminate manual feeding . . . allow continuous operation of the mill. Add rugged construction to this, and you have a mill which produces a uniform grind from 20 to 325 mesh with an absolute minimum of replacements and downtime.



BRADLEY PNEUMATIC HERCULES MILLS

See Chemical Engineering Catalog or for complete information, write for Catalog No. 63

BRADLEY PULVERIZER CO.
superior grinding equipment since 1891

LONDON ALLENTOWN, PA. BOSTON

MEETING CALENDAR

May 18-20 — 45th mid-year meeting, Chemical Specialties Manufacturers Assn., Hotel Drake, Chicago, Ill.

May 20-21—Chemical Market Research Assn., annual meeting, Plaza Hotel, New York.

June 9-10 — Seventeenth Annual Convention of the Association of Southern Feed and Fertilizer Control Officials, Velda Rose Motel, Hot Springs, Arkansas.

June 14-17 — National Plant Food Institute, Annual Convention, Greenbrier Hotel, White Sulphur Springs, W. Va.

June 22-25—Agricultural Institute of Canada, Annual Meeting with cooperating societies, Winnipeg, Man.

June 27—Del-Mar-Va Peninsula Fertilizer Assn., annual convention, Hotel George Washington, Ocean City, Md.

June 29-30 — Fertilizer Industry Conf., University of Illinois, Urbana.

June 29-30 — California Fertilizer Conference, University of California, Davis.

July 7-9 — Pacific Northwest Plant Food Assn., 10th annual Regional Fertilizer Conference, at Tacoma, Wash.

July 29—Kentucky Fertilizer Conference, Guignil Theater, University of Kentucky campus, Lexington.

Aug. 3-7 — Gordon Research Conf. on Biochemistry and Agriculture, Kimball Union Academy, Meriden, N. H.

Sept. 20-24—Canadian Agricultural Chemicals Assn., annual convention, Chateau Frontenac, Quebec, Canada.

Oct. 13-14 — Western Agricultural Chemicals Assn., fall meeting, Villa Hotel, San Mateo, Calif.

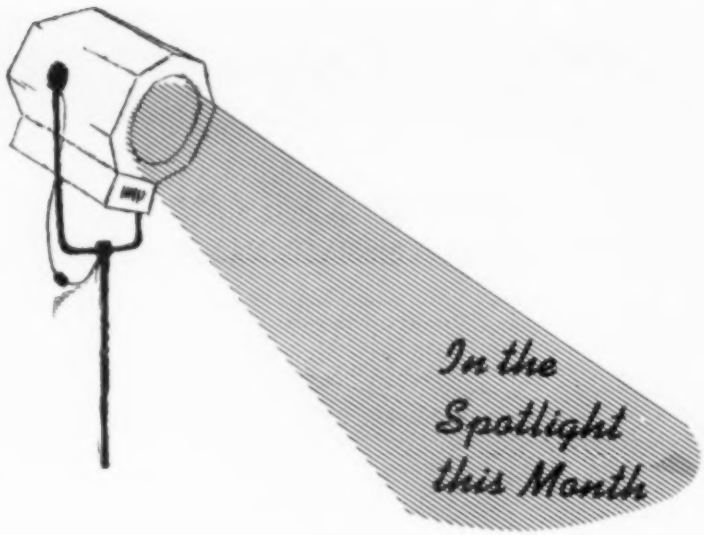
Oct. 21-23—National Agricultural Chemicals Association, 26th Annual Meeting, French Lick-Sheraton Hotel, French Lick, Indiana.

Nov. 4-6—Fertilizer Industry Round Table, Mayflower Hotel, Washington, D. C.

Nov. 9-11 — California Fertilizer Assn., 36th Annual Convention, Fairmont Hotel, San Francisco.

Nov. 16-20 — National Aviation Trades Assn., 20th Annual Convention, New Orleans, La.

Nov. 30-Dec. 3—Ninth annual meeting, Entomological Society of Canada and 96th annual meeting of Entomological Society of Ontario will be held jointly with the annual meeting of the Entomological Society of America, Detroit, Mich.



- **A Non-Typical Dealer** . . . Operations at Kilgore Seed Co. include pesticide formulation, distribution of products of 18 national pesticide manufacturers; the usual retail sales of fertilizer and seed—but salesmen are technically trained, and in position to make recommendations to farmer. Kilgore also has its own chemical laboratory and experimental farm. Page 32.

- **Granulation of 3-2-2** . . . That ammoniating solution containing the least free ammonia for unit of total nitrogen is the most economical. Where such formulating is done, a table can be prepared showing this ammonia-to-total nitrogen relation for rapid reference. Page 35.

- **Emulsification of Herbicides** . . . To avoid oiling out, it is suggested that oil and emulsifier be pre-mixed before water is added. Bypass agitation has been found particularly satisfactory in making good emulsions. Page 37.

- **Liquid Fertilizers** . . . The practical limit of $N + P_2O_5 + K_2O$ in liquid mixes has been about 32 per cent before "salting out" occurs—if the temperature falls to the freezing point. The development of a new process to produce superphosphoric acid opens the way to higher analyses in the future. Dry mixed fertilizers may be obtained with total nutrient content above 50 per cent. Page 41.

- **About Insecticides** . . . Another installment in our series of articles reviewing various phases of the agricultural chemicals industry. In this issue, Donald Frear presents a general discussion on insecticides and outlines what a dealer or saleman should know about them. Page 44.

- **Measuring Fertilizer Liquids** . . . Positive displacement meters have been used satisfactorily in measuring flow of phosphoric acid and anhydrous ammonia. Accuracy is maintained by referring to a specific gravity-temperature curve. Page 47.

KRAFT BAG CORPORATION, through correct construction of your multiwall shipping sacks, will reduce seepage and spoilage of contents while minimizing your shipping and storage problems.

If your product fits into a bag –
let us make the bag to fit your product!

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Ave., N.Y. 20, N.Y. • Daily News Bldg., Chicago 6, Ill.

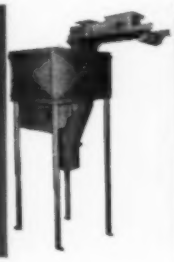
Integrated mills at St. Marys, Georgia and Gilman, Vermont

Gilman PAPER CO.
• St. Marys Kraft Corp.
• Command Tape Div.
• The Lillwood Corp.
• Kraft Bag Corp.

AC

Our Newest
KRAFTPACKER

Open Mouth Bag Filling Machine provides maximum accuracy and speed. May we tell you about our stainless steel models? Remarkable in performance. Surprisingly low in price.



☐ We are interested in improving our bag.
☐ We are interested in your Kraftpacker.

NAME OF COMPANY_____

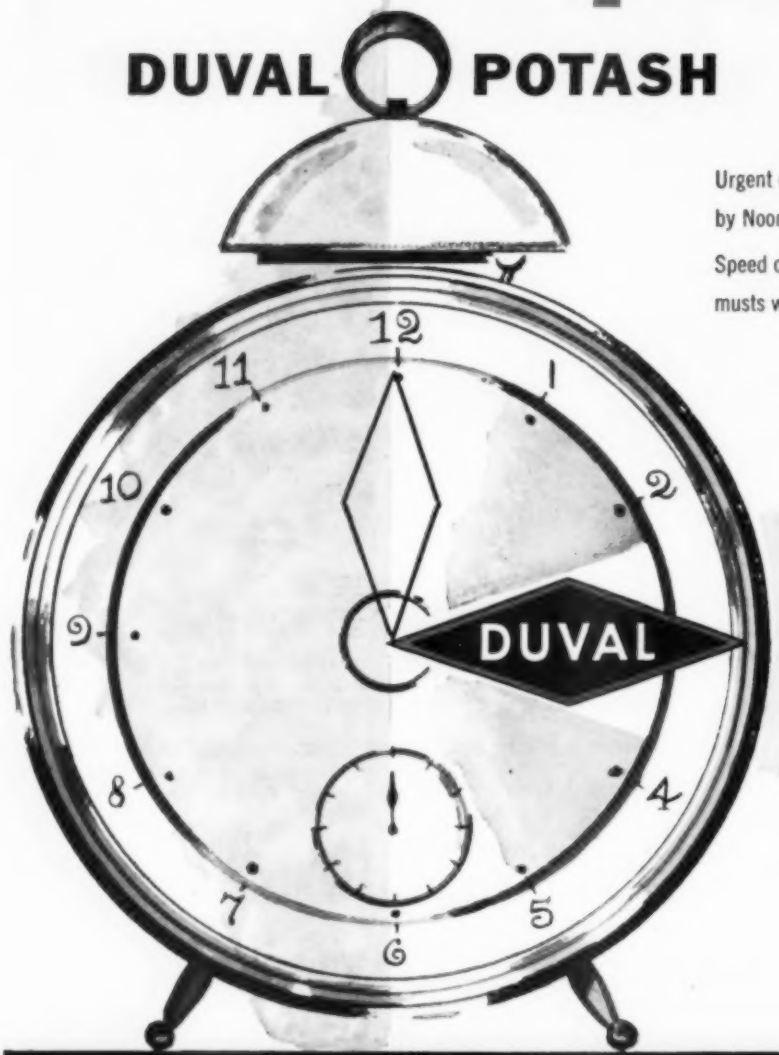
ADDRESS_____

CITY_____ ZONE____ STATE_____ PRINCIPAL_____

PRODUCT MFD._____

same day shipment

DUVAL POTASH



Urgent orders shipped same day if received by Noon or possibly mid-afternoon.

Speed of handling and quality are always musts with Duval and Ashcraft-Wilkinson Co.

High Grade Muriate of Potash...

DUVAL SULPHUR & POTASH COMPANY

Exclusive Distributors

ASHCRAFT-WILKINSON CO.

HOME OFFICE

ATLANTA, GEORGIA

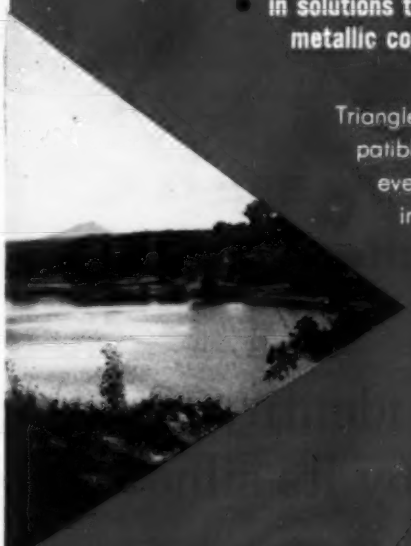
Cable address: Ashcraft

Norfolk, Va. • Charleston, S. C. • Tampa, Fla. • Jackson, Miss. • Columbus, Ohio • Montgomery, Ala. • Des Moines, Iowa

TRIANGLE BRAND COPPER SULFATE

a dependable product in your agriculture picture

- **for tough-to-mix solutions**
- **in solutions requiring 25.2% metallic copper**
- **in solutions that need 53% metallic copper**



Triangle Brand Copper Sulfate is compatible with most insecticides. It blends evenly in fertilizers as a soil enricher, and in feeds as a dietary supplement.

WATER TREATMENT

Triangle Brand Copper Sulfate controls pond scum and algae in farm waters.

WOOD PRESERVATIVE

It prevents decay and termite damage to fence posts.

For information on formulating with Triangle Brand Copper Sulfate, write

PHELPS DODGE REFINING CORP.

300 PARK AVENUE, NEW YORK 22, NEW YORK

can you identify this bug by its silhouette?

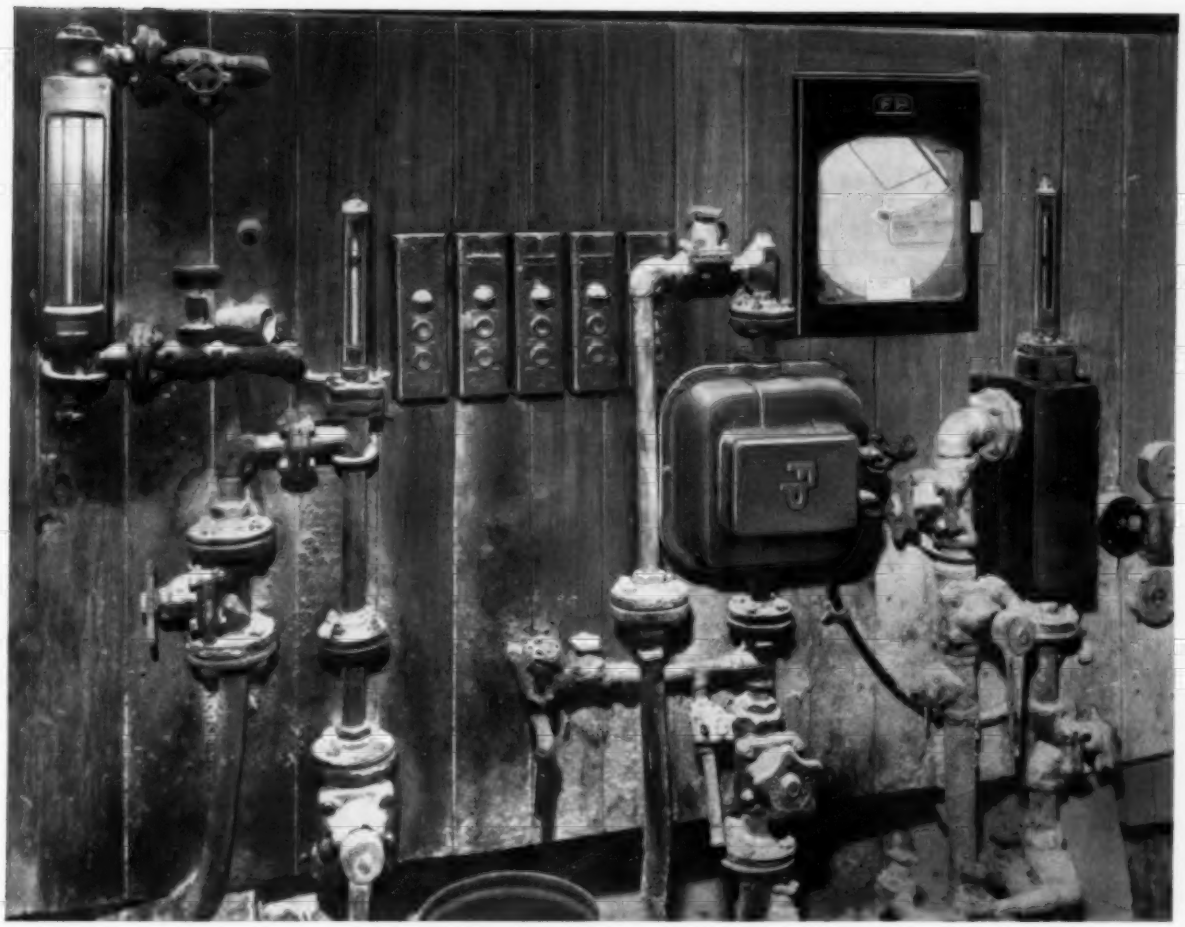
Call it a mite and you call it right. Diamond Ovex controls it effectively.

Each application is effective for a long time and gives excellent protection against mite build-up. Yet Ovex has a residue tolerance easily met at recommended rates, and low toxicity to desirable insects.

Available as a 50% wettable powder or as technical material for formulators. Notable for its compatibility with other common spray ingredients, Ovex can be used in multiple spray mixes for substantial savings in cost of application.

Write for details. Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals



One-inch F&P magnetic flowmeter measures wet process phosphoric acid to an accuracy of better than ±1%, independent of viscosity, density, or piping configuration at Baltimore, Maryland plant of Fertilizer Manufacturing Cooperative.

MEASURE WET-PROCESS PHOSPHORIC ACID ACCURATELY with an F&P MAGNETIC FLOWMETER

Talk about problem liquids! Wet-process phosphoric is highly corrosive, carries about 0.6% suspended solids, and its viscosity varies all over the map with temperature. Differential pressure and other types of flowmeters *can't* provide the reliable, high accuracy metering demanded in this service. NOW . . . with the introduction of the Fischer & Porter magnetic flowmeter . . . the problem is solved.

Unlike conventional meters, the corrosion-proof, erosion-proof F&P *magnetic* flowmeter has no pockets or stagnant areas where solids can collect . . . no obstructions to cause pressure drop. And rate of flow is measured to better than ±1% accuracy—independent of viscosity, density, or turbulence.

Other standard F&P features permit any F&P secondary instrument to be used with *any* F&P magnetic flowmeter. No custom matching necessary. Recorders are ideally suited for either volumetric or gravimetric record-keeping. And a simple in-case adjustment provides the same accurate direct reading gravimetric measurements despite changes in specific gravity.

Get the facts on the F&P magnetic flowmeter NOW! Contact the F&P field engineer nearest you, or write for Catalog 10D1416. Fischer & Porter Company, 1159 County Line Road, Hatboro, Pa. In Canada, write Fischer & Porter (Canada) Ltd., 2700 Jane Street, Toronto, Ontario.

FP FISCHER & PORTER COMPANY *COMPLETE PROCESS INSTRUMENTATION*

Use the proven XYLENE-BASE Diluent with Dependable Uniformity!

ESPESOL 5

Proved by Formulators Everywhere as

AN ECONOMICAL, NON-PHYTOTOXIC DILUENT!

ESPESOL 5 PROVIDES:

- Constant weight (pounds per gallon)
- Uniform flash point
- Consistent aromatic content
- Narrow boiling range

More and more formulators are using non-phytotoxic Espesol 5 because it is an economical water-white, Xylene-base diluent that possesses absolute uniformity. Offer *your* customers a premium product by using this premium quality, high specification diluent in your formulations.

Of advantage to formulators with multi-plant locations is the fact that specifications for Espesol 5 are identical at all Eastern States terminals — no need for changes in your formulations. Available in drum, transport, tank car, barge and ship tank lots. Mail coupon for complete information.

Eastern States Petroleum & Chemical Corporation

Eastern States Petroleum and Chemical Corporation
P. O. Box 5008
Houston 12, Texas
Please send additional information on Espesol 5.

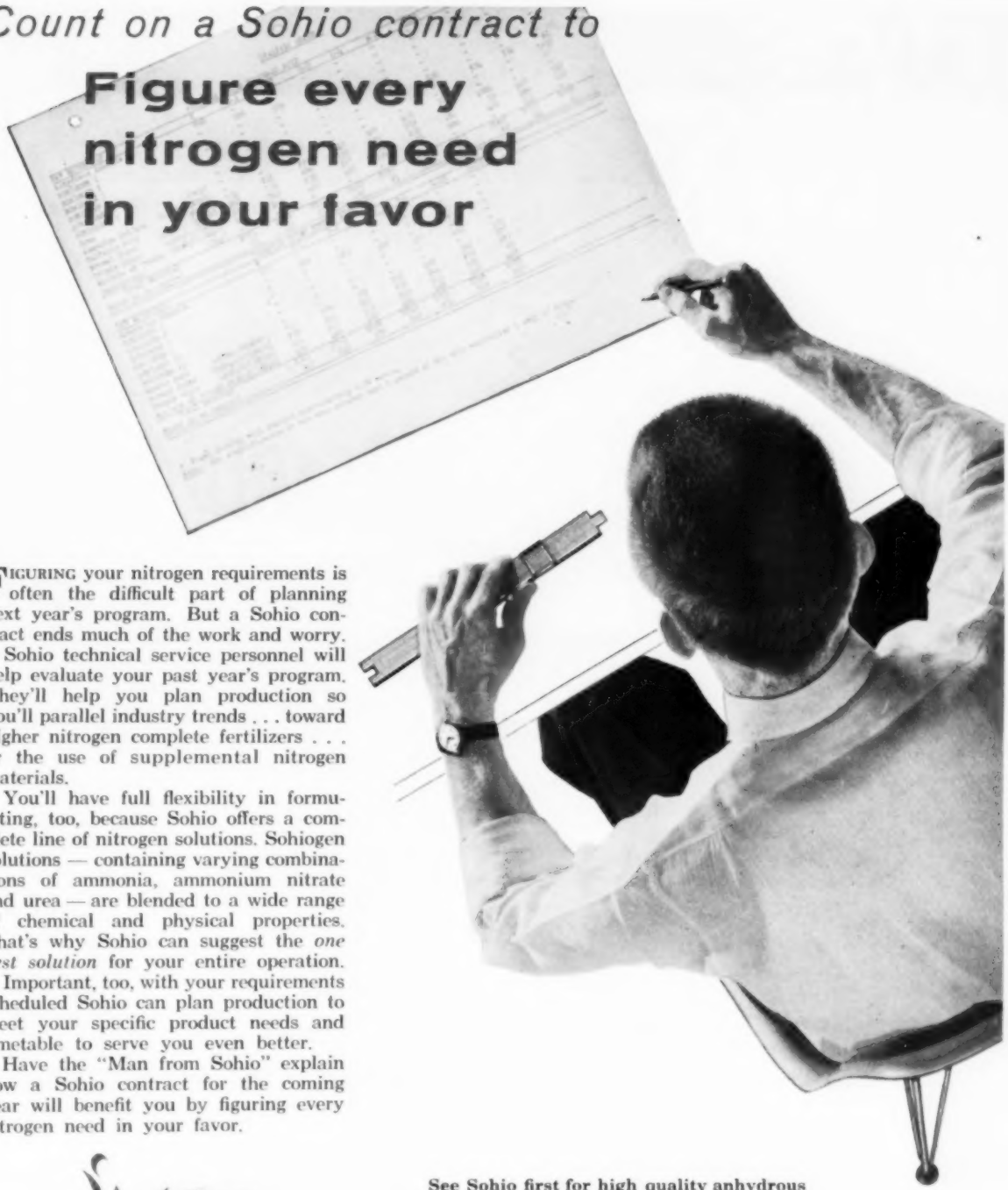
Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

Post Office Box 5008—Houston 12, Texas—Phone WAlnut 3-1651
Chicago Office: 1011 Lake St., Oak Park, Illinois, Phone Village 8-5410
New York Office: 10 Rockefeller Plaza, New York, Phone Circle 7-2520
Cleveland Office: 20800 Center Ridge Rd., Cleveland, Ohio, Phone EDison 3-0188
Louisville Office: 4th and Broadway St., Louisville, Ky., Phone JUniper 3-7634
Atlanta Office: 3121 Maple Drive, N.E., Phone CEdar 3-3227
Los Angeles Office: 110 S. Euclid, Pasadena, Phone RYan 1-0278

U. S. Terminals:
Houston, Texas • Chicago, Illinois • East Liverpool, Ohio
Madison, Indiana • Brownsville, Texas • Savannah, Georgia
Carteret, New Jersey • Los Angeles, California

Count on a Sohio contract to

Figure every nitrogen need in your favor



FIGURING your nitrogen requirements is often the difficult part of planning next year's program. But a Sohio contract ends much of the work and worry.

Sohio technical service personnel will help evaluate your past year's program. They'll help you plan production so you'll parallel industry trends . . . toward higher nitrogen complete fertilizers . . . or the use of supplemental nitrogen materials.

You'll have full flexibility in formulating, too, because Sohio offers a complete line of nitrogen solutions. Sohiogen solutions — containing varying combinations of ammonia, ammonium nitrate and urea — are blended to a wide range of chemical and physical properties. That's why Sohio can suggest the *one best solution* for your entire operation.

Important, too, with your requirements scheduled Sohio can plan production to meet your specific product needs and timetable to serve you even better.

Have the "Man from Sohio" explain how a Sohio contract for the coming year will benefit you by figuring every nitrogen need in your favor.

See Sohio first for high quality anhydrous ammonia — aqua ammonia — coated 45% or uncoated 46% urea — and 18 nitrogen solutions, including those containing urea.

SOHIO

. . . we're serious about SERVICE at Sohio

SOHIO CHEMICAL COMPANY

FORT AMANDA RD., P. O. BOX 628 • LIMA, OHIO

Phone CApitol 5-8015 or wire (TWX call letters LM-497)

12-59

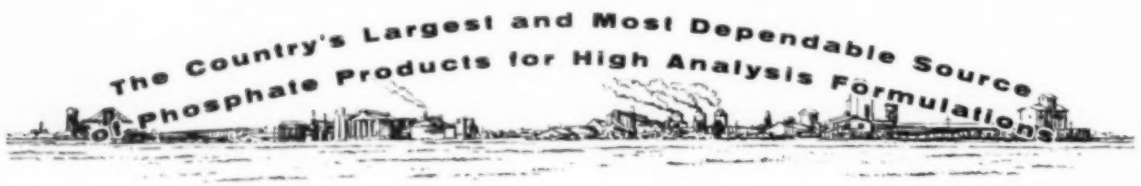
USPP

Highest purity acid to assist in reducing formulation cost and maintaining consistent high quality in all of your phosphate processing.

Manufactured to the following specifications

52-54% P_2O_5
Solid less than 1% by Weight
Specific Gravity (60°F) 1.68-1.73

Available In Rubber Lined Tank Cars
For Technical Service on all USPP products, Contact BRADLEY & BAKER



For scheduling and requirements—Contact our Sales Agents

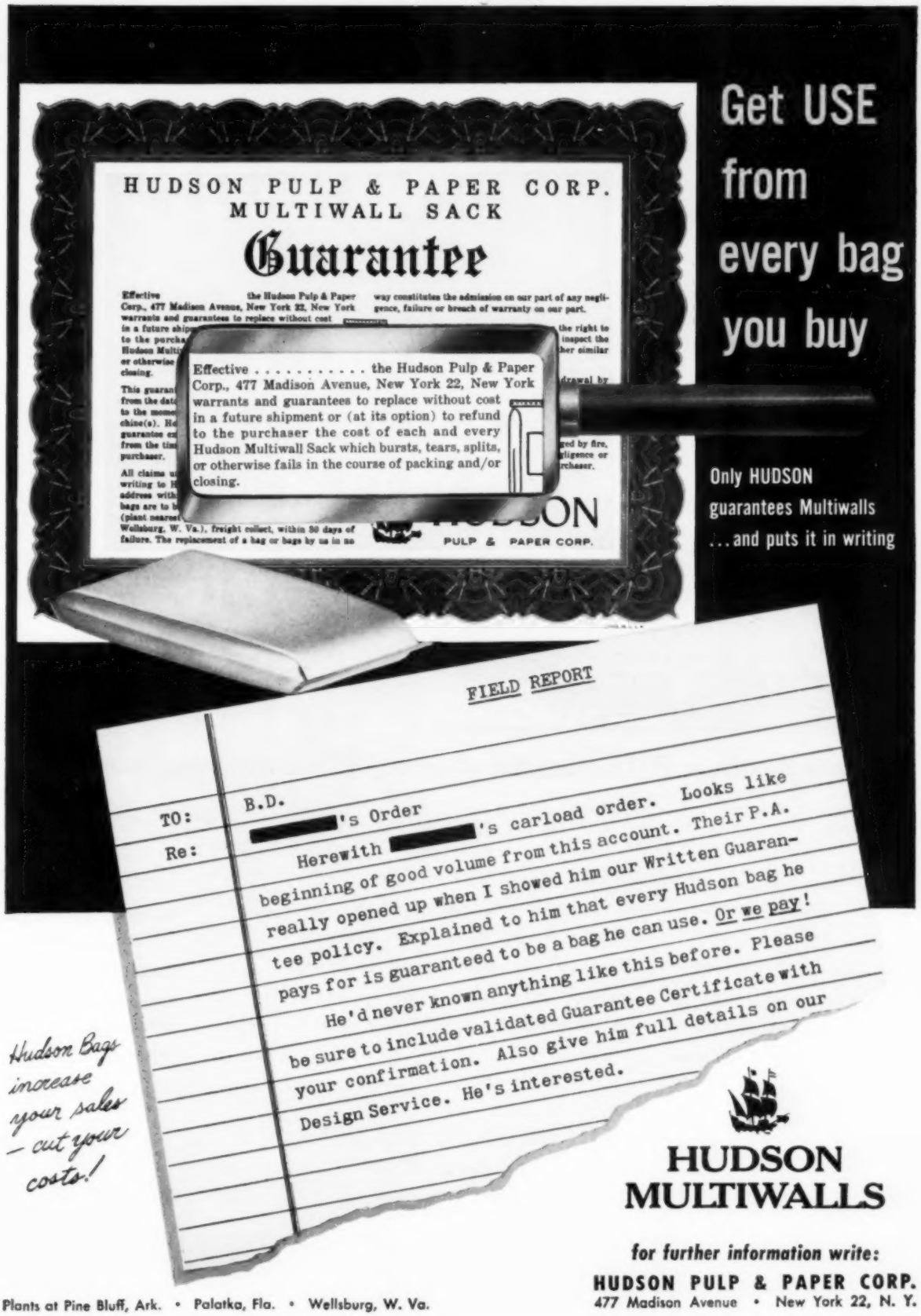
BRADLEY & BAKER

U.S. PHOSPHORIC PRODUCTS

TAMPA, FLORIDA

Division

TENNESSEE CORPORATION


HUDSON PULP & PAPER CORP.
MULTIWALL SACK
Guarantee
Effective ..... the Hudson Pulp & Paper Corp., 477 Madison Avenue, New York 22, New York warrants and guarantees to replace without cost in a future shipment or (at its option) to refund to the purchaser the cost of each and every Hudson Multiwall Sack which bursts, tears, splits, or otherwise fails in the course of packing and/or closing.
PULP & PAPER CORP.
Get USE from every bag you buy
Only HUDSON guarantees Multiwalls ...and puts it in writing
FIELD REPORT
TO: B.D.
Re: [redacted]'s Order
Herewith [redacted]'s carload order. Looks like beginning of good volume from this account. Their P.A. really opened up when I showed him our Written Guarantee policy. Explained to him that every Hudson bag he pays for is guaranteed to be a bag he can use. Or we pay!
He'd never known anything like this before. Please be sure to include validated Guarantee Certificate with your confirmation. Also give him full details on our Design Service. He's interested.
Hudson Bags increase your sales — cut your costs!
HUDSON MULTIWALLS
for further information write:
HUDSON PULP & PAPER CORP.
477 Madison Avenue • New York 22, N. Y.
Plants at Pine Bluff, Ark. • Palatka, Fla. • Wellsburg, W. Va.

The Versatile Fungicide

Is there another **Fungicide** offering these advantages?

You get so many more advantages with Copper fungicides — used as a spray or dust on practically all truck crops in the control of persistent fungus diseases — Tri-Basic provides control of citrus and grape diseases, also on many deciduous fruits — Tri-Basic has excellent adherence qualities and protects longer — lower disease control cost, greater yield of top quality produce.

Longer Protection
Easy to Apply
Economical
Upgrades Quality of Fruits & Vegetables
Longer Shelf Life
Corrects Copper Deficiencies
Effective Control
Always Dependable
Compatible
Plentiful Supply

TRI-BASIC COPPER SULFATE
Quality Controlled from Mine to Finished Product

For further information please make requests on your company's letterhead.

TC TENNESSEE CORPORATION
TENNESSEE CORPORATION
617-29 Grant Building, Atlanta, Georgia

Arcadian® News

Volume 4 | For Manufacturers of Mixed Fertilizers | Number 5

How to Extend Your Season and Sell More Tonnage Now

The heavy shipping season for mixed fertilizers is now behind us. But the season is not yet over for alert manufacturers of mixed fertilizers. They will start now to extend their season and increase their total tonnage, by aggressively selling nitrogen materials (liquid and dry) for top-dressing and side-dressing.

Thousands of farmers in your sales territory are now buying nitrogen for supplemental application. It will pay you to make sure that your mixed fertilizer customers buy their supplementary nitrogen from you. It's good business to supply your customers' complete plant food needs.

You strengthen customer loyalty and you get a bigger share of the fertilizer market, when you are prepared to provide all of the mixed goods analyses and straight materials your customers need and want. It pays to establish your prestige and your leadership as a dependable, "full-line" source of supply.

By selling straight nitrogen now, you get many practical benefits: 1) You increase your total sales and profits. 2) You help farmers to get better yields and insure that response to your mixed fertilizers will not be limited by lack of nitrogen. 3) You spread your overhead expense over a bigger tonnage. 4) You keep your sales staff busy. 5) You build farmers into exclusive customers for you and your dealers.

Nitrogen Division, Allied Chemical, sells nitrogen for use in the manufacture of mixed fertilizers and for direct application. Nitrogen Division has always fostered the role of nitrogen in a balanced fertilizer program and has spent millions of dollars to promote the use of mixed fertilizers. Nitrogen Division has also established ARCADIAN® Nitrogen Products as the leading source of supplementary nitrogen for direct application.

(Continued on following page)

(Continued from preceding page)

It will pay you to let Nitrogen Division work with you in helping you to offer your customers a complete line of mixed fertilizers and straight nitrogen materials. Many different ARCADIAN Nitrogen Solutions are available for the manufacture of every mixed fertilizer analysis now in demand. Many different ARCADIAN Nitrogen Products (liquid and dry) are also available for direct application. Powerfully-advertised and promoted, these products are well-known and widely-used by farmers everywhere.

Let Nitrogen Division help you build your volume and your profits. You can extend your season and sell more tonnage right now by contacting the nearest office of Nitrogen Division, Allied Chemical Corporation.

Here is one of the many Nitrogen Division full-page farm magazine advertisements, promoting the use of mixed fertilizers.

Sampling Can Protect You As Well As Your Customer

Far too few samples are taken and analyzed from the average run of mixed fertilizers. Too few samples at the mixer, the dryer, the cooler and the storage pile, that is. Adequate and efficient sampling in the manufacturing process saves you from costly overages and also protects your customer from goods averaging under plant food guarantees. In the long run, a thorough sampling and testing program at your plant will do both you and your customers far more good than any increase in testing by state fertilizer control laboratories.

Sampling at the mixer reveals the degree of perfection in the mixing of dry ingredients as well as the success of desired chemical reactions between ammonia, superphosphates and any acid that has been added. If your nose doesn't detect any smell of ammonia in the air at the mixer, don't let it stop you from taking samples. Ammonia fumes can escape through ducts, either in a continuous or batch mixer, without the operator being aware of the loss by "smell" test. Even when acid is used to capture excess ammonia, you can still lose ammonia through drafts or suction in flues and ducts. The best system is to take samples at the mixer at intervals throughout the discharge cycle, and in proportion to the volume of materials discharged. You may find out some startling things about the operation of your mixer by analyzing these samples separately.

Sampling Should Be Systematic

Sampling from the dryer should reveal any "burning out" of nitrogen during this phase of manufacture. Samples taken from the cooler should reveal any "classification" of the mix by high velocity air that may strip out unequal amounts of different ingredients. Analysis of these samples can help you adjust and improve your methods of granulation. For both granular and semi-granular goods, this careful check on methods may enable you to produce the right quality and

Arcadian

DRY NITROGEN PRODUCTS FOR DIRECT APPLICATION

AMMONIUM NITRATE
Pelleted Nitrogen Fertilizer

UREA 45 Nitrogen Fertilizer
Pelleted Urea Nitrogen

A-N-L® Nitrogen Fertilizer
Nitrogen with Magnesium

AMERICAN NITRATE of SODA
Nitrate Nitrogen and Sodium

Arcadian

LIQUID NITROGEN PRODUCTS FOR DIRECT APPLICATION

Golden URAN® Nitrogen Solution
Urea, Ammonium and Nitrate Nitrogen

FERAN® Nitrogen Solution
Ammonium and Nitrate Nitrogen

NITRANA® Nitrogen Solution
Nitrate and Ammonia Nitrogen

Anhydrous Ammonia
Concentrated Ammonia Nitrogen

analysis mixture with minimum use of acid.

Thorough sampling from the pile can tell you what chemical reactions occur in the pile, the effects of separation by particle size, and the results of any contaminants in the pile. Samples taken from the first half day's production of large storage piles can often help you make all needed corrections. But good results from the first day's run are not enough. You must maintain these good operating procedures to get economical formulation and correct plant food proportions.

Some critics say that storage pile sampling is not accurate enough to compare with actual bagging and sampling of fertilizer under inspection conditions. Yet many manufacturers get an excellent check on quality, even from the largest storage piles, by systematic sampling. They take regular samples throughout the building of the pile. They collect the samples from random spots from top to bottom of cone piles, and deep enough to reach through any stratification of materials. For best results, they take samples from at least 10 points in any sizeable pile at each sampling, and start sampling early so that they don't miss the core of the storage pile.

Test Samples Promptly

Speedy analysis of your samples pays off. Some manufacturers have been alarmed by belated reports on mixer samples that showed faulty analysis—reports that were completed long after a big storage pile had been built up. You can waste just as much money in your fertilizer mixer with sampling, if you don't check your samples quickly.

Other manufacturers who discover faulty analysis from mixer samples feel relieved when the storage pile samples show a nearly correct analysis. This is fine as a protection for your customers, but it doesn't save you from ammonia losses and other unnecessary expenses caused by poor mixing. Manufacturing fertilizer is a precision business today—if you want to make money. Regular sampling and prompt analysis of samples can help you keep equipment, staff and operating procedures at an efficient level.

The Nitrogen Division, Allied Chemical, technical staff is ready to help you perfect your sampling methods, and also to assist you in developing the best techniques for analyzing the samples and studying the results. Contact Nitrogen Division, Allied Chemical, 40 Rector Street, New York 6, N. Y.

Don't Make the Same Mistakes Next Season!

To make your next season better, now is the time to correct any problems and difficulties that caused loss of business this spring.

Bottlenecks in production, bagging, loading and shipping facilities should be analyzed while they are fresh in mind. Schedule necessary changes to be carried out during the off-season months ahead.

If you were caught short on raw materials or mixed fertilizer this spring, try to pin down the reasons now. If additional storage is needed, you will want to line it up soon before another rush season. If you were short on raw materials go over your inventory and scheduling procedure on incoming products and try to set up a system which will permit more accurate advance ordering next season.

Note worn parts in your equipment so that they can be replaced during the summer shutdown. Replenish your stock of necessary spare parts. Check your plant personnel and line up indicated replacements, make promotions and give further training where needed.

Go over the formulae you are now using and compare with the laboratory analyses you have been receiving on your mixed fertilizer samples to determine where adjustment should be made to stay closer to guaranteed grade. Also look for formula changes which will help cut costs next year.

Be Sure Your Customer Knows He Is Satisfied!

The surest way to nail down repeat sales next year is to see to it that customers are satisfied with what they bought from you *this* year! Short of making actual yield checks, your best bet for dramatizing response to fertilizer is to point out growth differences.

A little time spent now to point out these growth differences can pay big dividends in customer satisfaction and those vital repeat sales. Then, too, if there should be cases where your fertilizers are *not* showing the expected response, it's important to know about them so that the necessary corrections can be made before next year's selling season. In that regard, always be watchful for evidences of deficiency in secondary and trace minerals, as well as in major plant foods. Remember that the lack of any one of the elements required for plant growth might very well limit the performance of your fertilizer!

HERE'S THE BIG LINE OF Arcadian® NITROGEN SOLUTIONS

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION

Allied Chemical

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Hopewell, Va., P. O. Drawer 131 ..... Glenview 8-6301
Ironton, Ohio, P. O. Box 98 ..... Drexel 7-4366
Omaha 7, Neb., P. O. Box 166 ..... Bellevue 1464
Raleigh, N. C., 16 W. Martin St. ..... Temple 3-2801
Columbia 1, S. C., 1203 Gervais St. ..... Alpine 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E. Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
Columbia, Mo., 1134 Highway 40W ..... Gibson 2-4040
Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869 ..... Kalamazoo 5-8676
St. Paul 14, Minn., 764 Vandalia St. ..... Midway 5-9141
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

Fertilizers won't cake—flow freely in the field

Many a farmer has been cursed by the serious caking problem which so often occurs when deliquescent fertilizers are stored in damp or humid conditions. And many a formulator has learned that this can easily be prevented by using Celite*. These tiny particles of diatomite surround the fertilizer crystals or prills with a protective coating that can prevent contact between them and thus minimize caking.

At the same time Celite fillers improve flowability. The particles are not only microscopic in size but extremely irregular in shape. Thus Celite coated fertilizers flow more freely. As little as 2% of Celite assures more uniform application in the field.

A Celite engineer will gladly help you put the right grade to work in your fertilizer. Just phone him at your nearest Johns-Manville sales office or write Johns-Manville, Box 14, New York 16, New York. In Canada, address 565 Lakeshore Road East, Port Credit, Ontario.

*Celite is Johns-Manville's registered trade mark for its diatomaceous silica products

when formulated with

CELITE

diatomite fillers

JM PRODUCTS

Johns-Manville CELITE

INDUSTRY'S MOST VERSATILE MINERAL FILLER

HERCULES RESEARCH–
First Step Toward Improved Pesticides

From the Hercules Research Center and Agricultural Chemicals Laboratories come an ever increasing number of products that contribute to more productive farming and increased comfort for leisure hours. Here are the established members of the Hercules family: *Toxaphene agricultural insecticide; Thanite® for oil base and aerosol insecticides; Delnav* phosphate pesticide; meta Delphene* insect repellent.*

Today in the laboratories research continues on the products that will join them in the future. But before they become available you can be sure that thousands of compounds have been carefully screened and extensive tests conducted in the field because only the best is good enough to meet the standards of Hercules research. That's why you can look to Hercules for leadership in the development of insecticides, fungicides, and herbicides.

Agricultural Chemicals Division, Naval Stores Department

HERCULES POWDER COMPANY

INCORPORATED

900 Market Street, Wilmington 99, Delaware

*Trademark

USPP

The Country's Largest and Most Dependable Source
Phosphate Products for High Analysis Formulation

TRIPLE SUPERPHOSPHATE

RUN-OF-PILE
High Porosity — High Water Soluble P_2O_5. Low moisture content and correct size distribution.

GRANULAR
Uniform Particle Size, dust free, low moisture content. Will not lump or bridge over in hopper. Guaranteed 46% Available Phosphoric Acid. In Bag or Bulk.

COARSE
Controlled screen size, honeycomb structure, high water soluble P_2O_5. For intermediate ammoniation to produce a semi-granular product.

For scheduling and requirements — Contact our

Sales Agents
BRADLEY & BAKER

U.S. PHOSPHORIC PRODUCTS
TAMPA, FLORIDA
Division
TENNESSEE CORPORATION

WONDERWALL® did it— *cut breakage down to less than one bag per car*

Fact! That's the report coming to us from Mr. R. H. Pierce, Purchasing Agent of Cooperative Farm Chemicals Association, Lawrence, Kansas. Mr. Pierce states:

"Our tests with WONDERWALLS convinced us—showed less than one broken bag per freight car. Then, in our first shipment—14 cars of fertilizer in WONDERWALL bags, we found only 9 broken bags, 6 of which were caused by nails.

"We are using WONDERWALLS that are 20 pounds lighter in total paper basis weight than the ordinary kraft multiwalls we had been using, and we know we're getting a better bag.

"The single biggest advantage in using WONDERWALL bags is satisfied customers."

WONDERWALL is West Virginia's new, tougher multiwall that outperforms ordinary bags because it's made of Kraftsman Clupak* paper. This extraordinary paper stretches and withstands punishment that breaks ordinary kraft.

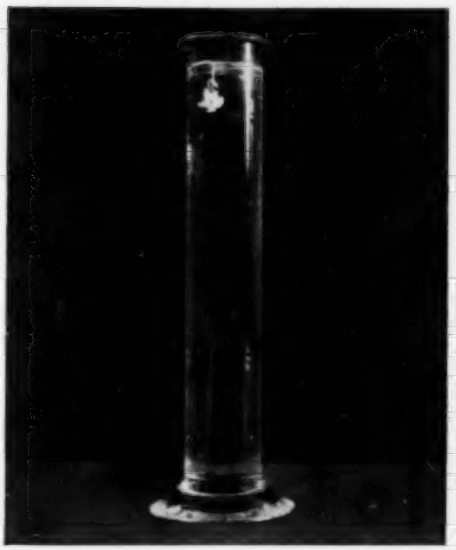
See how the WONDERWALL would reduce your breakage and, very possibly, also *cut actual bag expense.*

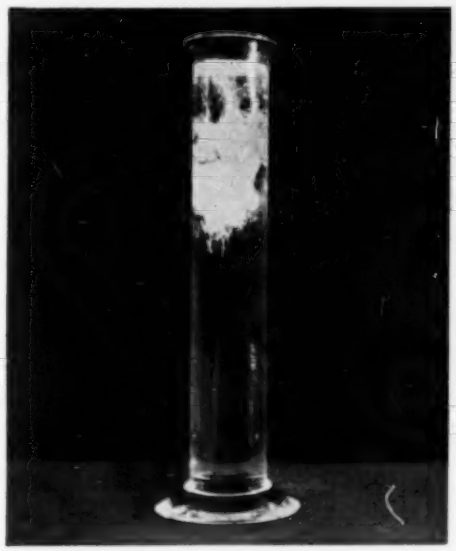
Let a West Virginia representative show you how you can save with WONDERWALL. Just write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Avenue, New York 17, N.Y.

Clupak, Inc. trademark for extensible paper manufactured under its authority.

WONDERWALL
Best bag of all

West Virginia
Pulp and Paper





THIS TIME-DISPERSION TEST shows convincingly how TRITON X-151 and TRITON X-171 impart excellent spontaneity in water. In the first photo, a few milliliters of a Toxaphene concentrate containing these emulsifiers are added to a water-filled graduate. 30 seconds later emulsification is practically complete—*even without agitation.*

From drop to emulsion in 30 seconds with TRITON emulsifiers

When pesticides are formulated with TRITON X-151 and TRITON X-171, they disperse quickly in water even without agitation. This means that with one or both of these emulsifiers you can now improve the salability of practically any emulsifiable concentrate.

Unlike ordinary emulsifiers, TRITON X-151 and TRITON X-171 impart improved spontaneity *along with* excellent stability in the resulting emulsion. Because they're ether-type emulsifiers, they also enable the concentrates themselves to better resist breakdown during long storage.

An ever-important advantage of TRITON X-151 and TRITON X-171 is that they're the only two emulsifiers you need for a wide variety of toxicant-solvent systems and water hardness conditions. This simplifies processing and storage, and eliminates waste if solvents or pesticides are later changed. Write today for samples and complete data.

Chemicals for Industry

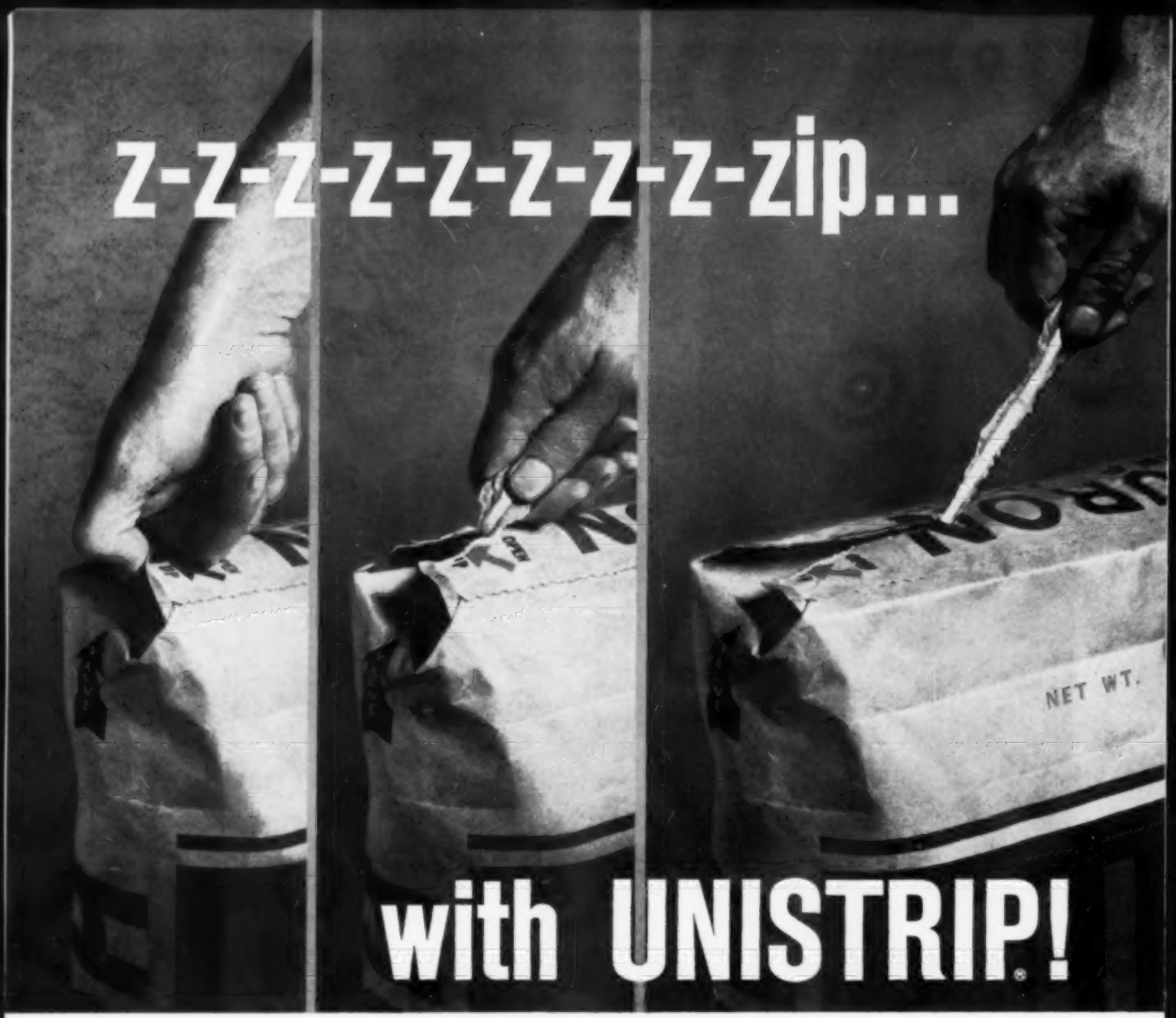
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

TRITON *is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.*

z-z-z-z-z-z-z-z-z-zip...



with UNISTRIP!

UNION's new easy-open tear strip for Pasted Valve Diamond-O Multiwalls

Pull the strip—the bag is open! UNISTRIP's zip-open speed gives your customer brand new ease and convenience in pouring and dumping. Cost? Only 75¢ per 1000 for 6″ strips. Longer UNISTRIPS available —up to 10″. Quotation on request.

Write today for free production-run sample of a Diamond-O Multiwall with the new easy-open UNISTRIP. Try it yourself!

UNION MULTIWALL BAGS

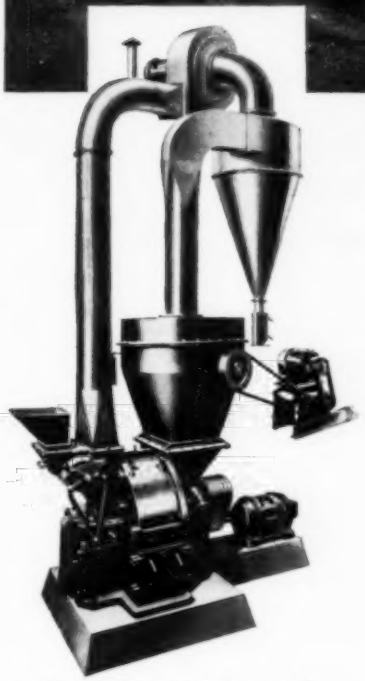
Union Bag-Camp Paper Corporation • 233 Broadway, New York 7, N. Y.

for Producing

UNIFORM INSECTICIDE DUSTS

You can depend on

RAYMOND IMP MILLS



IMP MILL with independently driven revolving whizzer

THE Raymond Whizzer-equipped Imp Mill is a compact unit, especially attractive for medium size plants where minimum space is a factor, and where there is a frequent change from one grade or type of formulation to another.

It provides a clean dust-free automatic system for handling the several operations of grinding, blending, classifying, cooling and conveying. It produces the field strength dusts direct from the technical material, delivering a uniformly fine fluffy finished product.

Whizzer separation gives a wide range of fineness control by one simple adjustment, and insures the intimate blending of insecticides and diluents. The air used for separating also serves for conveying and cooling.

The Imp Mill offers practical economies: low cost installation readily fitted to plant layout; simplicity in operation and control requiring little supervision; long service life and low maintenance.

Write for Bulletin No. 84 describing the Raymond line of insecticide grinding mills.

COMBUSTION ENGINEERING, INC.

Raymond Division

1114 W. BLACKHAWK ST.
CHICAGO 22, ILLINOIS

SALES OFFICES IN PRINCIPAL CITIES

Combustion Engineering-Superheater Ltd., Montreal, Canada

MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade uniform, coarse and granular Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

61 BROADWAY • NEW YORK 6, N. Y.

Leonard Wickenden Dies

Leonard Wickenden, who retired in 1950 as a consulting chemist in New York, died last month in Weston, Conn. He was 73.

Mr. Wickenden was the author of several books on organic gardening and allied subjects. In 1955 the Devin-Adair Co. published his book, "Our Daily Poison: The Effects of DDT, Fluorides, Hormones and Other Chemicals on Modern Man."

•

Report Rise In Earnings

The International Minerals & Chemical Corp. last month reported net earnings of $2,045,000 for the third fiscal quarter ended March 31, 1959, equivalent to 83 cents per share on the 2,343,327 common shares outstanding. For the corresponding period a year ago, earnings were $882,000, or 33 cents per share.

Sales for the quarter just ended were $20,722,000, up 15 per cent over the $26,682,000 for the third quarter a year ago, IMC reports. Company officials said that sales and earnings trends in the third quarter of this year were strong as contrasted to the same period a year ago, when unfavorable weather and general economic conditions deferred some normal third quarter earnings until the fourth quarter.

•

Hercules Sales at 63 M

Albert E. Forster, president of the Hercules Powder Co., expects first quarter net sales and operating revenues to be approximately $63,000,000 with earnings about 56 cents a share. Earnings, for the year, he said, probably will be around $2.37 a share, which would be a new earnings record for the company.

•

DDT For International Use

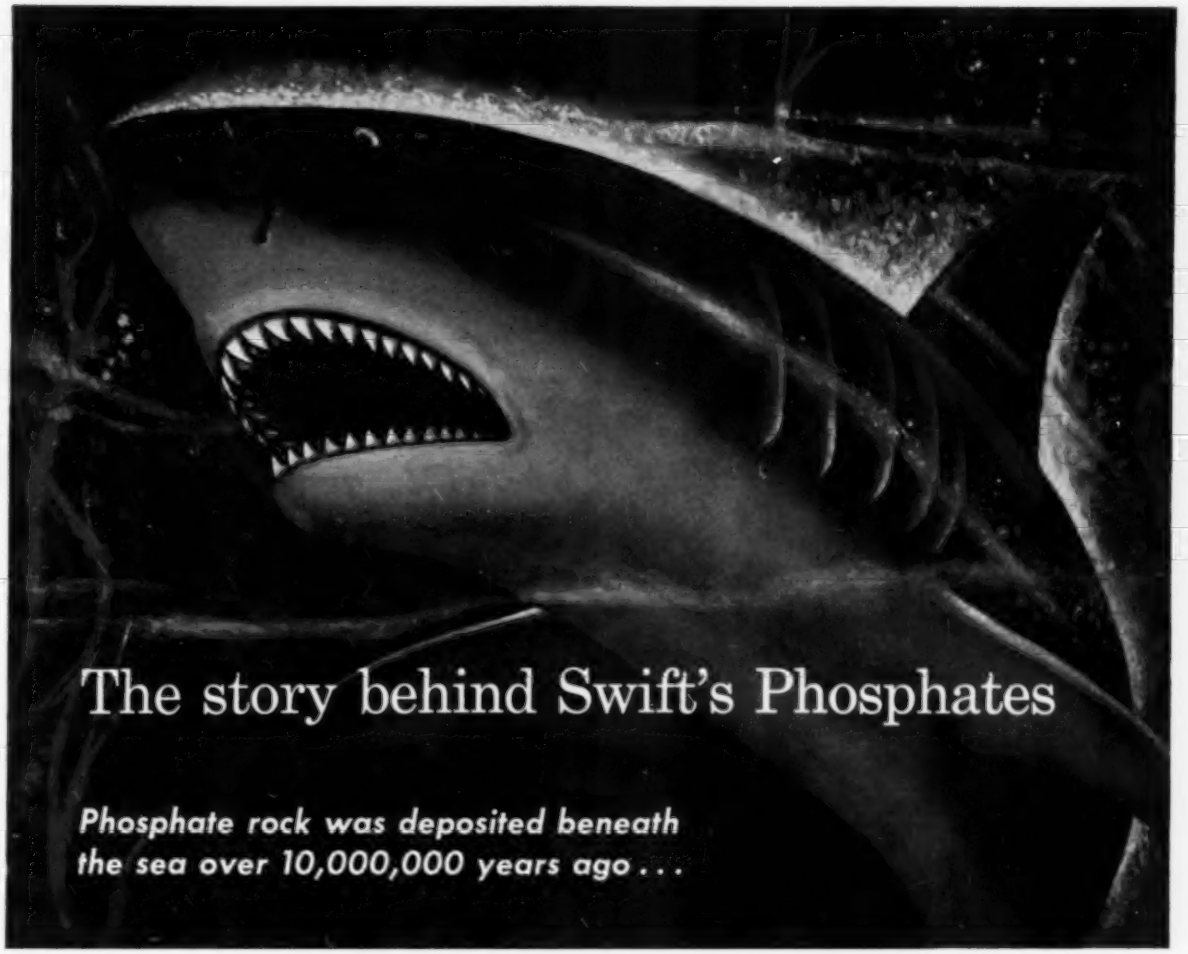
A purchase of 12.5 million pounds of 75 per cent wettable DDT by UNICEF (United Nations Children's Fund) has been split three ways among these firms: Allied Chemical International—6.11 million pounds, worth over $1.5 million; Montrose Chemical Corp. of California—4.8 million pounds, worth $1,25 million; and Geigy Chemical—1.53 million pounds, worth almost $384,000.

UNICEF will use the pesticide in the worldwide antimalaria program. Cooperating on the same program is the International Cooperation Assn. which has purchased a total of almost 46.15 million pounds of DDT since last November. Ten firms shared this market, worth about $11.79 million. GSA also has purchased 709,500 pounds of dieldrin formulations for the program, to be used in areas where insects show some resistance to DDT.

•

Fertilizer For Korea

The International Cooperation Administration has issued authorizations to Korea to purchase $1,950,000 worth of nitrogenous fertilizers. The authorization covers contracts entered between March 13 and June 30, 1959 and a terminal delivery date of Sept. 30, 1959.



Today, Swift technology transforms it into forms you can use most profitably

Fossilized remains of giant prehistoric sharks in Swift's Florida phosphate rock deposits tell us these beds were formed at the bottom of a sea 10 to 15 million years ago.

But all Florida pebble phosphate rock had the same beginning. The difference comes much later. It comes in the extra care Swift takes in processing to assure uniformity of grade and grind. It comes in Swift's careful attention to your delivery requirements.

Before you settle on your source of phosphate rock, ground phosphate rock or triple superphosphate, ask to have a Swift Phosphate Center representative outline what extra care can mean to you. Or write for illustrated brochure to SWIFT & COMPANY, Phosphate Center, Bartow, Florida.

THE SERVICE SOURCE FOR ALL YOUR PHOSPHATE NEEDS

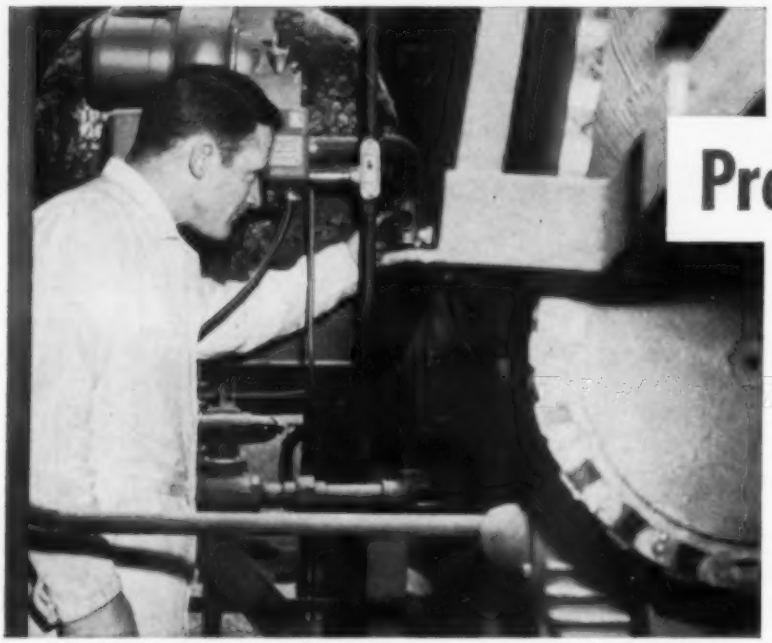
Swift
104TH YEAR

P-1

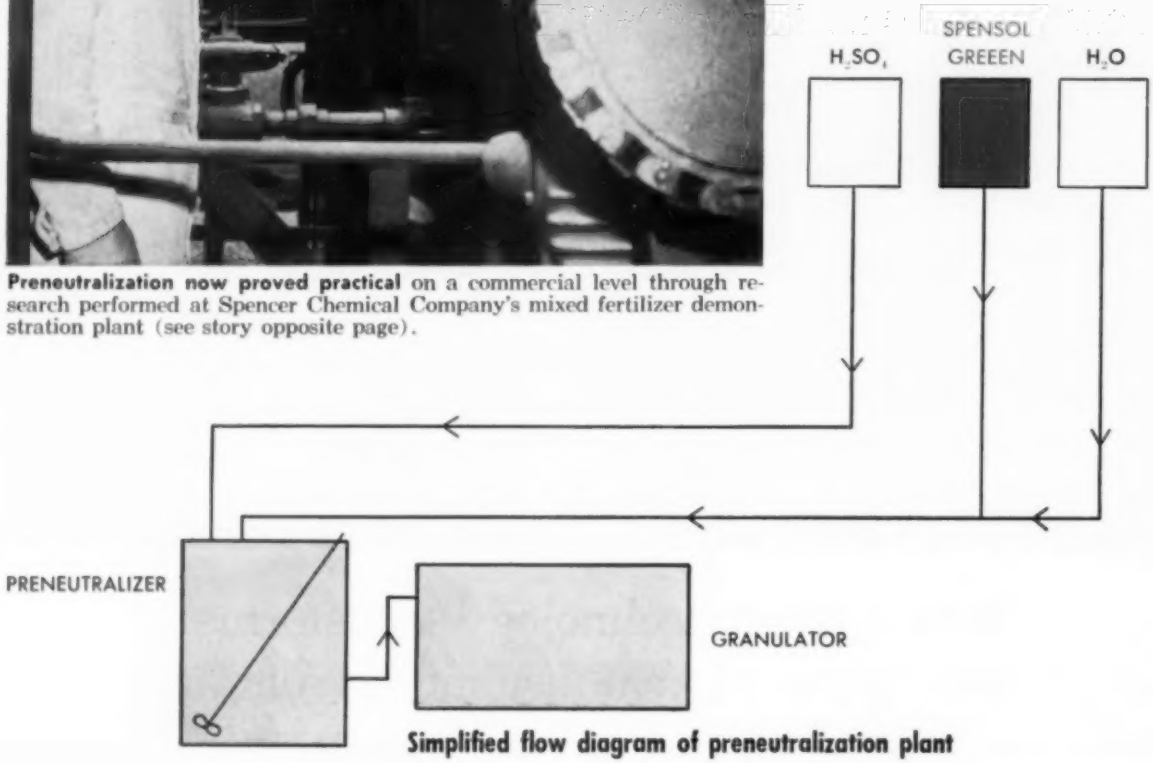
To Serve Your Industry Better

WITH PHOSPHATE ROCK,
GROUND PHOSPHATE ROCK
AND PC-47 TRIPLE SUPERPHOSPHATE

Preneutralization



Preneutralization now proved practical on a commercial level through research performed at Spencer Chemical Company's mixed fertilizer demonstration plant (see story opposite page).



Simplified flow diagram of preneutralization plant

Members of Spencer's Technical Service Team check the results of an experiment. Here, data is being checked for commercial possibilities.

SPENCER®

AGRICULTURAL CHEMICALS

PROGRESS REPORT

—Key To Cutting Your Production Costs As Much As $5.00 Per Ton:

Spencer Chemical Company now offers a way you can produce up to 20% nitrogen fertilizer without using dry nitrogen:

LIKE to manufacture nonphosphate and inverted grades without dry nitrogen materials? The latest research from Spencer Chemical Company* indicates that you can — just by using a large-scale operation of the preneutralization process.

Proven practical by Spencer in their mixed fertilizer demonstration plant, the process has already been put to work for a number of manufacturers with the help of Spencer's Technical Service Team.

By using preneutralization, these manufacturers can produce a 1-1-1 like a 12-12-12, inverted ratios such as 3-2-2 like a 15-10-10 and a 2-1-1 like a 20-10-10. And here's a sample of the savings you can expect with preneutralization:

Boosts Profit Potential

When producing 20-10-10, you would normally use about 10 units of SPENSOL GREEEN and 10 units of a dry nitrogen, such as ammonium sulfate. With preneutralization, you use 20 units of SPENSOL GREEEN and no ammonium sulfate—a saving in production costs of as much as $5.00 a ton, depending on current raw material costs in your area.

Small Cost, Big Benefits

The cost of installing a preneutralization operation is small, Spencer reports. Extra equipment needed will amount to $4,000 to $6,000, according to Spencer's Technical Service Department.

Because Spencer has pioneered in the development of this new type of operation, manufacturers are seeking the company's advice on planning, installation and operation of preneutralization. Already, the Spencer Technical Service team has helped several companies through all stages from preliminary planning to final on-stream operation.

A Spencer man can provide this know-how, based on his own commercial experience, if preneutralization equipment is needed in your mixed fertilizer plant.

More News Ahead From Spencer's Demonstation Plant

As these and other problems are solved by Spencer Chemical Company's Technical Service Department, complete reports will be made available to the fertilizer industry.

If you would like additional information on preneutralization, write Technical Service Department, Spencer Chemical Company, Dwight Bldg., Kansas City 5, Mo.

*While Spencer Chemical Company does not make or sell mixed fertilizer, it is constantly working to help find ways of producing higher-analysis mixed fertilizer with low-cost materials.

America's Growing Name in Chemicals

SPENCER CHEMICAL CO., Dwight Bldg., Kansas City 5, Mo.; District Sales Offices: Atlanta, Ga.; Chicago, Ill.; Memphis, Tenn.; Kansas City, Mo.; Works: Pittsburg, Kans.; Chicago, Ill.; Henderson, Ky.; Vicksburg, Miss.; Orange, Texas.

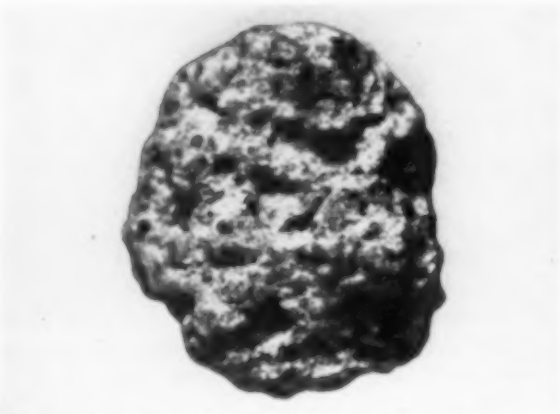
Insist on SPENSOL GREEEN (Spensol Nitrogen Solutions)

SPENCER®

Team up Cyanamid's phosphate products and services for superior mixed fertilizers, economically produced

At Brewster, Florida, Cyanamid mines high grade phosphate rock and manufactures quality TREBO-PHOS* Triple Superphosphate and phosphoric acid.

Add to these fine products Cyanamid's technical and traffic service and you've got an unbeatable combination. Here are a few of the ways Cyanamid helps you manufacture better mixed fertilizers for less money.



Product quality – Porosity of magnified (30x) TREBO-PHOS granule shows why it ammoniates up to 5% without evolution of fumes. Porosity is *controlled;* TREBO-PHOS does not pick up moisture readily, produces a dry, drillable, well-conditioned fertilizer.

Shipping service – Cyanamid traffic experts are experienced at routing phosphate shipments to eliminate avoidable delays. Your plant keeps humming along on schedule. This service is yours when and as you desire it.

Product planning – Cyanamid Technical Service personnel have country-wide experience in formulation and manufacture of mixed fertilizers at lowest cost. Often, what may be new problems for you, are solved problems for them.

Manufacturing assistance – Cyanamid people are versatile. They work where you work, help you get more out of your facilities. Often, they have suggested changes in procedure that have resulted in better mixed goods, produced more economically.

*TRADEMARK

To manufacture fertilizers that sell...
mix with Cyanamid's Phosphates and Service

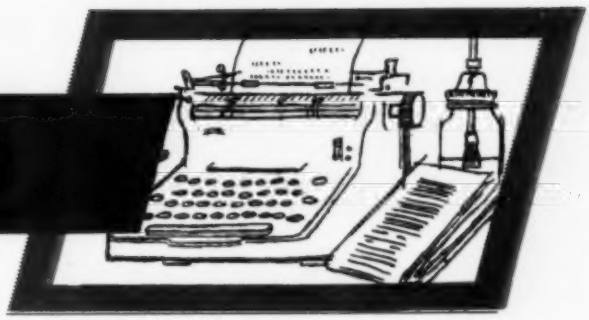
TREBO-PHOS* TRIPLE SUPERPHOSPHATE | PHOSPHATE ROCK | PHOSPHORIC ACID

American Cyanamid Company, Phosphates and Nitrogen Department, N. Y. 20, N. Y.

CYANAMID

PHOSPHATE PRODUCTS

EDITORIALS



A NEW bill has just been introduced into Congress (HR 6436) which would bring a number of added types of agricultural chemical products under the Federal Insecticide, Fungicide and Rodenticide Act. This would be accomplished by expanding the present definition of "economic poison" to include nematocides, defoliants, desiccants and plant regulators.

This proposal has the support of a number of organizations representing growers, many of the officials who are charged with the responsibility for regulating use of such products, and also the manufacturers of the products concerned (through support of the new bill by the National Agricultural Chemicals Association). The measure also obviously has strong sponsorship in the Congress, as HR 6436 was introduced in the House by the politically prominent Chairman of the House Committee on Agriculture, Harold D. Cooley.

The industry has wisely recognized that these products should, and inevitably eventually will, be regulated under some federal control. They obviously feel that it is better for all concerned to have these products placed, where they properly belong, under regulation as pesticides, rather than having them end up perhaps, as they might otherwise, under the purview of the proposed new "food additives law."

Nematocides, defoliants, desiccants and plant growth regulators are closely related in every way to pesticide chemicals. They resemble them chemically, they are made by the same companies, and are bought and applied by the same group of end users for the same general purpose, to increase agricultural output and quality. In some cases, as a matter of fact, they are even the same products. A number of materials employed as insecticides or herbicides, for example, may also be used, in different concentrations, as defoliants, desiccants or plant growth regulators. Such products as 2,4-D and the gibberellins are obvious examples.

In cases where regulation of industry products is necessary, it is always desirable that it proceed in a uniform manner, with no conflict of controls or control agencies. An orderly solution of the problem is indicated in this case by the early passage of HR 6436. Making these products subject to the provisions of the Miller pesticide law would automatically put established procedures into effect for setting residue tolerances, and provide the framework for orderly marketing and use of the growing number of these increasingly important agricultural chemical specialties.

ALL too seldom do growers use as much plant food on their crops as agricultural experts recommend. It is the exception rather than the rule when fertilizer use even closely approximates the amounts which our experiment stations tell us are economically sound.

Thus it is a real case of "man bites dog" when we hear of a recommendation that less fertilizer be used. The Tobacco Quality Improvement Committee, at a recent meeting in Kentucky, went on record as favoring reduced fertilizer applications. Yields have gained as a result of increased fertilizer use, they admit, but they believe quality of the tobacco has suffered.

This is a situation which the technical experts in fertilizer use should look into without delay. If the allegation is true, it has serious implications for fertilizer sales to a group of growers who have long been important customers of the fertilizer industry. If the report is not accurate, the true facts should be brought out, fully and promptly.

Kilgore...

—a progressive farm store which has expanded operations to include pesticide and fertilizer mixing

DURING the 48 years since The Kilgore Seed Company was founded in Florida, there have been many changes in the agricultural industry. The firm, now a subsidiary of Associated Seed Growers Inc. of New Haven, Conn., has 14 stores scattered across the length and breadth of the state, showing how they have progressed with the Florida farming industry.

As farming has become more specialized, the need for controlling the diseases and pests which attack plants has become more acute. Realizing that there can be many a slip between seeding time and harvest time, the Kilgore operation has kept in step with the times by providing farmers with pesticides and plant nutrients. These materials now account for about 40 per cent of gross sales.

In addition to being Florida distributor of Asgrow seeds, Kilgore is distributor of brand name products from such nationally known firms as:

American Cyanamid Co.
U. S. Rubber Co.
Chas. Pfizer & Co., Inc.
California Spray-Chemical Corp.
E. I. DuPont de Nemours & Co.
Tennessee Corp.
Rohm & Haas Co.
Shell Chemical Corp.
Geigy Chemical Inc.
The Dow Chemical Co.
Pennsylvania Salt Mfg. Co.
Miller Chemical & Fertilizer Corp.
Olin Mathieson Chemical Corp.
Larvacide Products Inc.
B. G. Pratt Co.
Pittsburgh Coke & Chemical Co.
Monsanto Chemical Co.
American Chemical Paint Co.

At their headquarters in Plant City, Florida, Kilgore also mixes and blends their own brand name insecticides and fungicides. In their 1958 80-page catalog, the pesticide section covers 18 pages listing these products. The brand name items frequently combine the Kilgore name with a description of the product. For example, a chlordane preparation is named Kilchlor. A DDT preparation is called Kilcide. A toxaphene preparation is called Kilphene. A copper compound is called Kilcop. Further descriptions in the brand names include numbers or letters of the alphabet which indicate percentage of the ingredients. For example, Kilphene 5-Dust contains 5% toxaphene; while Kilphene 10-Dust contains 10%. Kilchlor 40-W indicates 40% wettable chlordane.

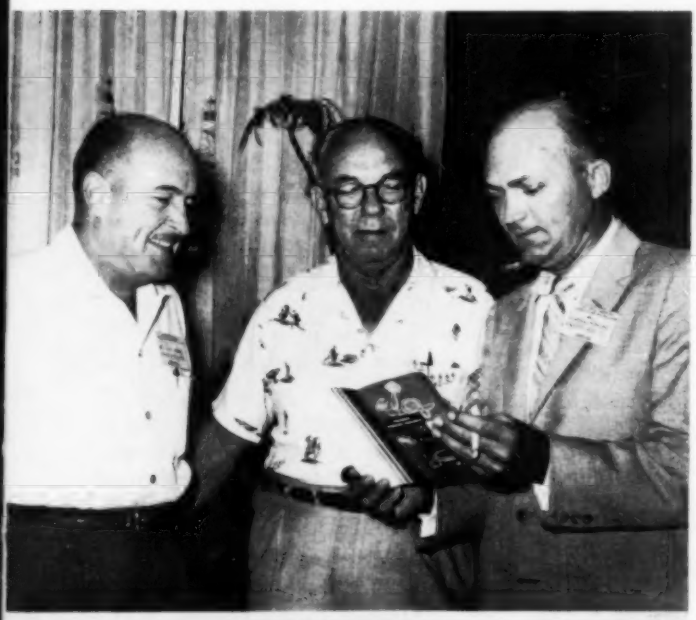
The annual catalog also contains listings and descriptions of plants, insects, disease symptoms, and recommendations for treatment and control. This catalog also serves, from Plant City, a large mail order trade throught southeastern United States.

The Kilgore store managers and salesmen not only keep abreast of the farmer and his growing problems, they try to keep ahead, because the supplier who has the answers on what the farmer needs and when he needs it is the one most likely to make the sale.

To fill the farmer's constant need for knowledge about control of new pests and new plant diseases, Kilgore personnel spend about as much time in the field as they do in their stores. During the growing season, which in Florida includes about nine months of the year, Kilgore has a man in the field of every customer at least once a week. This man is not just an order taker, he is also qualified to make recommendations regarding specific quantities and brand of chemicals needed.

In order to keep up to date, salesmen attend monthly technical sales meetings. At these meetings, company trained entomologists and pathologists discuss latest developments, under the direction of Mr. Paul Mabry, manager of the pesticide division of the company.

Kilgore maintains a fully equipped chemical laboratory at Plant City where new formulations are tested. Field experiments are also conducted to determine the value of new products as fast as they come on the market.



Photos on facing page (l to r):

● Supermarket type gondola shelf display of insecticides and spray equipment on showroom floor. Warehouse section of Kilgore store has no posts or supports. Prestressed concrete beams support the roof.

● Kilgore representatives are always on hand at trade gatherings. Shown here at the annual convention of the Florida Fruit & Vegetabe Association are: (l to r) field man, Earl Adams; Gene Smith, manager of the Pompano Beach store; and Russell Herring, manager of the West Palm Beach Store.

● B. H. James, Jr., assistant manager of the Kilgore store at Pompano Beach Fla. is shown here with some chemicals manufactured by the Kilgore Seed Co. at Plant City Fla.

The Kilgore company also maintains their own experimental farms where crops are grown in Florida under the same conditions as those found by their customers. New products are tested carefully, and information on developments is passed along to all personnel. The company plant breeders, pathologists and horticulturists are constantly in contact with field laboratories of the Florida Agricultural Experimental Stations.

Store managers and sales personnel work closely with county agents. They attend Field Days, and spread word of their findings among their customers.

Kilgore men perform soil tests for pH content for any customer at any time without charge. Additional soil samples are also referred to fertilizer companies or Experiment Stations, and their findings made available without charge.

The company has an enormous collection of color slides on plant diseases and insects. When called upon to talk to farmers or at farm meetings, the Kilgore field representatives are fully prepared to illustrate their presentations with these slides.

A typical Kilgore store is their newest at Pompano Beach, Florida. This modern building is 50 feet wide and 300 feet deep. It has a front showroom 35 feet deep, where seeds, insecticides, fertilizers and garden supplies are displayed and sold in small quantities. This department not only serves as a convenience for the household needs of Kilgore's large grower customers, but also provides the company with a source of employment and revenue during the three summer months when big farming activities are at a minimum.

Gene Smith, manager of the Pompano Beach store, says "Unlike the northern store, where the seed and fertilizer dealer often resorts to the sale of feed, coal or wood during the winter months, we stick to our own line of merchandise during our slack season."

During the heavy farming sea-

Covered loading dock shown here has a ramp at one end. Four trucks can be serviced simultaneously.

son, the operation of the retail garden supply outlet does not conflict too much with the big grower trade. Most growers pick up their supplies from the store each day at about 5:00 in the morning. This is due to the fact that Florida growers, as a rule, farm hundreds or thousands of acres with practically no warehouse facilities of their own. Many farmers maintain operations further north during the summer months, thus producing two crops each year.

The majority of the retail or walk-in garden supply business is done later in the day after the big growers have been taken care of.

This retail department is connected to the split level bulk sales area with an inclined ramp. There is also an inclined ramp and loading dock for bulk sales, where four tractor trailer size trucks can be accommodated simultaneously on one side of the building. The other side of the building has a rail siding where four freight cars can unload simultaneously.

The bulk merchandise includes seeds, fertilizers, insecticides, inoculants, a complete line of bee supplies, other light farm equipment, and also an immense stock of containers for shipping fresh vegetables.

The Kilgore store at Pompano Beach maintains three trucks for delivery, but the major portion of their bulk merchandise is picked up by the grower, who takes it immediately to the field where it is to be used. In order to conserve warehouse space and to economize on movement, Kilgore makes direct delivery to customers on all orders of ten tons or more. A fleet of semi-trailers is maintained at the Plant City headquarters for this purpose and also to make delivery to branch stores.

Keeping in step with current farmer demand, Kilgore offers the services of its trained staff, tests formulations in own laboratory, and on its own experimental farm.

Mr. Smith, manager of the Pompano Beach store, has about 30 years experience in the farm supply trade. He has a staff consisting of assistant manager B. H. James, Jr., five salesmen, and three warehouse men. Two of the five salesmen spend almost full time in the field.

Another 30-year man, Mr. Earl Adams, spends his entire time as a roving salesman and trouble shooter. He covers the whole state, visiting with managers at each of the 14 outlets and calling on customers in the field. Mr. Adams is also active at trade meetings such as seedmen's conventions, nurserymen's conventions, growers' conventions, and Field Days and other activities sponsored by the State Experiment Stations.

Each of the Kilgore branch stores is a distributor for Asgrow seeds and a name brand fertilizer in the area of the store.

Re: Associated Seed Growers, Inc.

ASSOCIATED Seed Growers, or Asgrow, as the company is known to most produce growers and food processors, has been in the business of vegetable plant breeding and seed production for more than a century—since 1856—in fact.

In addition to the Kilgore Seed Company its other subsidiaries include Asgrow Texas Company of San Antonio; Grimm Alfalfa Seed Growers of Alberta, Ltd., Brooks, Alberta. Asgrow Export Corporation, Milford, Connecticut; and Asgrow Italia, S.p.A., Milan, Italy.

In recent years, the parent company has been moving toward the Kilgore farm store pattern of distribution in the major produce-growing regions of the country and now operates about a dozen Asgrow Farm Supply Stores including those at Milford, Conn; Florida, N. Y.; Vineland, N. J.; Exmore, Va.; Elizabeth City, N. C.; Charleston, S. C.; Indianapolis, Ind.; Phoenix, Ariz.; and at El Centro, Salinas, and Patterson in California, as well as its Texas outlets under the Asgrow Texas Company.

Although the Kilgore subsidiary is the only part of the organization now actively engaged in formulating agricultural chemicals, most Asgrow Farm Supply Stores distribute leading brand agricultural chemicals as a major component of their service to produce growers in their areas.★★

Granulation of a 3-2-2 Ratio Fertilizer

*by Elmer Perrine**

Nitrogen Division,
Allied Chemical Corporation

MAKING 3-2-2 grades is rapidly advancing the fertilizer industry into chemical processing and away from the conventional methods of manufacturing fertilizer. The economics, equipment design, safety and even the training of personnel for making some fertilizer grades include much that is common to the chemical industry. These points are strongly in evidence where the grades are granulated, and the plant is using ordinary ingredients with fertilizer equipment rather than the more exotic products that enter the market.

The final cost of a ton of high nitrogen fertilizer is influenced by many things beyond the original cost of the nitrogen. The combining of ammonia with superphosphate fixes the lowest cost nitrogen in fertilizer. The superphosphate should therefore be used at maximum efficiency.

With 100 per cent retention of the amount applied, 20 per cent superphosphate should react with as much as 5.5 pounds of ammonia per unit of P_2O_5. Triple superphosphate should react with as much as 2.5 pounds of ammonia per unit of P_2O_5. Formulation should therefore use the maximum amount of 20% superphosphate for its influence on the cost of nitrogen as well as for the usually lower cost of the superphosphate. One pound of ammonia reacts with 3.1 pounds of 66°Be sulfuric acid (93%). The industry usually formulates about 7.2 pounds of ammonia for each unit of P_2O_5 in phosphoric acid.

A pound of ammonia reacted with sulfuric acid produces over twice the B. T. U.'s of heat that is produced when the ammonia reacts with 20% superphosphate. In granulation this added heat is often well worth the cost of some acid beyond the exact needs of total neutralization.

The economics of formulation sometimes get relegated to a subordinate place in the struggle to fit the ingredients into the grade within the 2000 pounds limit of a ton, obtain maximum heat, include enough ammonium nitrate or urea or both for easy granulation, and meet the several fancies of salesmen, agronomists, and the customer.

Within reasonable limits, for the granulation of fertilizer that ammoniating solution which contains the least free ammonia for unit of total nitrogen will be the most economical. The man who does much formulating can simplify his work by using a table which shows this ammonia-to-total nitrogen relation. One nitrogen solution that is widely used in granulation as well as in pulverized fertilizer contains 10.8 pounds of ammonia per unit of total nitrogen. Another solution, also widely used, contains 8.9 pounds. These factors call for detailed study of heats, weights, cost of sulfuric and phosphoric acid, and liquid phase influence on granulation. When all of the ammonia from one unit of nitrogen is neutralized with acid, this can make the nitrogen from one solution cost more than may be necessary in some cases.

The last few units of nitrogen in one considered formula involved 30 pounds more dry weight for each unit of nitrogen from one solution than from another, when all of the ammonia was to be reacted with 20% superphosphate. The fact that the heavier result included .6 more units of P_2O_5 is not the main problem in 2-1-1 and 3-2-2 grades.

Anhydrous ammonia used with sulfuric acid has its place even in granulation, but the need for some additional ingredients such as ammonium nitrate to insure granulation seems to limit this practice quite sharply.

There is much more involved than merely the amount of acid used, but the problem of safety, of holding analysis, and of air pollution often become serious when great amounts of sulfuric acid are used directly in the fertilizer mass in conventional mixers. For some time the ingenuity of men and the capacities of equipment have been taxed by the higher 1-1-1 grades. The 2-1-1 and 3-2-2 grades of high analysis demand careful measuring at every step in the process.

Sulfuric acid at the rate of 370 pounds has been used and even more is anticipated for good gran-

*This discussion of formula recommendations for granulation of a 3-2-2 material was presented at the Fertilizer Industry Round Table meeting, November 5-7, 1958 in Washington, D. C.

ulation and economy in the 2-1-1 and 3-2-2 grades. It is understandable that some operators may look at this development with jaundiced eyes after their experience with much lower amounts of acid in conventional processes.

A development that was generally described before the 1957 meeting of the Fertilizer Industry Round Table favors the use of all of the acid being mixed with the appropriate amount of nitrogen solution in a separate operation prior to introduction into the mixer that handles the ammoniation of the superphosphate and the other normal mixing operations.

This process isolates the acid and nitrogen solution action and permits controls that have proven satisfactory in operations that are quite routine in the chemical industry.

Low Free Ammonia Solutions May be Used in Granulating 3-2-2 Grades—Recycle and Tonnage are Major Factors Determining Solution Choice

The comments below were presented by J. M. Daniel, Virginia-Carolina Chemical Corp., in Continuing the discussion on granulation.

GRANULATION of fertilizer grades such as 5-10-10 and 12-8-8, is well adapted to use of low free ammonia solutions either with or without urea. Typical ones which could be used are Nitrogen Solutions 450 (25-69-0), 420 (19-66-6), 440 (22-66-6), and 430 (20-68-6). The solution selected depends largely on climatic conditions, in order to avoid salting out.

There are two basic sets of conditions which each manufacturer must evaluate for himself: (1) Where maximum product tonnage is not mandatory and large amounts of recycle can be tolerated. (2) where the maximum production rate is necessary and recycle must be minimized.

In the first case, using preneutralization, it is conceivable that all the nitrogen could be obtained from solution in 15-10-10 and 12-8-8. High recycle rates would probably be necessary. In order to take advantage of the ammonia absorbing capacity of the phosphatic materials, it would be necessary to split the solution feed between the preneutralizer and the ammoniator. This entails expenditures for an additional flowmeter and pipe plus giving the operator one more liquid metering stream to control. For plants where anhydrous ammonia is available, this material could be metered into the ammoniator for the phosphate to absorb. Each company must evaluate whether the tonnage required justifies the expenditure for additional equipment. Products made from liquid raw materials will have a high ammonium nitrate content and require drying to very low moisture content. These products will also require use of coating agents to avoid caking.

In the second set of circumstances where a high production rate is necessary, it would be preferable to use solid ammonium sulfate. This would eliminate splitting the solution feed and the expenditure for additional equipment. Drying the product would be less critical and the amount of coating agent could be reduced. Formulating with solid sulfate will in most cases give a higher materials cost per ton. This must be balanced against labor and other operating costs per ton if large recycle rates are used.

We have made no pilot plant studies on grades with this ratio as yet, and 12-8-8 is the only one we have made in commercial scale equipment. Pilot plant studies will be made in the near future.

BOOK REVIEW

Phosphorus and its Compounds, Vol. I Chemistry, by John R. Van Wazer, Asst. Research Director, Monsanto Chemical Company, Interscience Publishers; New York, 1958. 954 pages. Price $27.50. *Reviewed By Vincent Sauchelli.*

The new qualitative and quantitative understanding of how atoms behave in their multitudinous interactions fostered by the modern theory of valence-bond and molecular-orbits shows definitely in this impressive, scholarly book. The author explains that up until quite recently the student in chemistry has been able to get a beautifully systematic discipline in organic chemistry, whereas the description of inorganic chemistry has been more or less "a hodge-podge of unrelated facts and often misguided fancy."

This observation is a terrific indictment. The author declares he is a "phosphorus chemist." He has indeed prepared a tome on the chemistry of phosphorus which will be most welcome to students, practicing chemists, chemical engineers and especially to the teaching fraternity.

The literature on the chemistry of phosphorus and its compounds is very extensive. This book attempts to cover practically all of the classes of the more important organic and inorganic phosphorus compounds. The references to the literature will be most helpful to scholars who may want to look up the literature on some particular subject.

Because of the nature and comprehensiveness of this volume it will perhaps not appeal to the general reader. That it should be in every library for reference use and be an indispensable book in every fertilizer company's library is the conviction of this reviewer. We recommend it without reservation.

The 1959 Fertilizer Industry Round Table will be held November 4-6 at the Mayflower Hotel, Wash., D. C.

Microbial Pest Control

an abstract of a paper by Yoshinori Tanada, assistant plant pathologist at the University of California, which appears in the *Annual Review of Entomology*, Vol. 4, pp. 277-302, 1959.

MICROBIAL control has advanced rapidly by adopting many of the principles and methods used in chemical control and in the parasite-predator branch of biological control. It has been pointed out that if the "economic level" of the host density is considerably lower than the "threshold level" of the disease, control will be temporary, and the pathogens have to be applied repeatedly as with chemical insecticides. This has been the case when microbial control has been applied against certain insects of field crops. If the economic level of the host density is higher than the threshold level of the disease, then control can be just as permanent as that accomplished by insect parasites. Such permanent control has been obtained in the case of certain insects of forest, turf, and pasture.

Microbial control has been applied in nearly all of the major countries of the world. Most of the field tests have been conducted with viruses and bacteria. Rickettsiae, fungi, protozoa, and nematodes have not been utilized extensively, because of difficulties inherent in their use, or because of their extreme dependence on environmental conditions.

Of the five general groups of virus diseases: nuclear and cytoplasmic polyhedroses, granuloses, polymorphic inclusion viroses, and the noninclusion viroses,—only the viruses of the granuloses and nuclear polyhedroses have been utilized extensively in microbial control. Among the bacteria, the entomogenous sporeformers have received increased interest in recent years, because of their great potentiality for insect control. So far, they are the only important bacteria that have been applied effectively in the field. These sporeformers may be divided roughly into two groups: those related to *bacillus cereus* (noncrystal - bearers) and *Bacillus thuringiensis*. Field experiments are still being conducted with the introduction and colonization of milky-disease organisms, and they have confirmed the early reports on the prolonged control of the Japanese beetle. The milky-disease organisms and related strains are also effective against the European chafer.

Among the sporeformers, the most extensively utilized group includes the crystal-bearing forms such as *B. thuringiensis* and its close relatives, *alesti*, *sotto*, "Anduze", and others. The crystals are highly toxic to certains insects and appear to be basis for the pathogenicity of these bacteria. *B. thuringiensis* and its close relative have been tested against more than 100 insect species, mainly Lepidoptera,—many of which were found to be highly susceptible to the bacteria. These bacteria have been used successfully against the oak processionary caterpillar, the pine processionary caterpillar, the alfalfa caterpillar, the imported cabbageworm, the diamond back moth, the hornworms, and others. Limited effectiveness has been obtained against the cabbage webworm and the cabbage looper, possibly because the spore dosage was too low. Contrary to promising reports of early workers, *B. thuringiensis* has been ineffective against the European corn borer, because the larva escapes the spore residue on the plant surface by boring into the leaf whorls. This bacillus also is not recommended for the grapeleaf skeletonizer, of which some of the larvae are definitely resistant.

As is generally known, pathogens may cause infections in insects through the external openings, through the integument, and by congenital transmission. In recent years, however, much attention has been placed on latent infections, especially with viruses, transmitted from generation to generation under natural conditions. Investigations have indicated a repellent effect when the spores and crystals of *Bacillus thuringiensis* and its close relatives were tested on young larvae of several insects. However, the spores had no repellent effect on the first-instar larva of the European cornborer. Inasmuch as repellent effects and quick-acting contact toxins would be of special value in insect control, especially on crops with a low economic threshold, further investigations along these lines with *Bacillus* spp. and *Beauveria* spp. may be highly profitable.

One of the controversial problems in microbial control, especially in the case of virus diseases, is that of latency. The confusion exists to some extent because of insufficient knowledge of the process of latent infections in insects. Some pathologists consider latency as the only possible answer to certain results observed with insect viruses in the laboratory and field. Other investigators consider latent virus infections widespread throughout the population of certain forest insects It has been implied that the successful field control of insects with viruses may have resulted from virus activation through superinfections. But this is highly unlikely in many cases, because the application of virus has resulted in rapid development of infection, epecially

(*Continued on Page* 101)

Emulsification of Herbicides

This report was prepared by J. W. Van Valkenburg and J. A. Kelly, and presented at the meeting of the Northeastern Weed Control Conference in New York City, January 7-9, 1959.

SINCE the introduction of plant-growth-regulator-type herbicides, such as 2,4-D and 2,4,5-T, a decade or more ago, contractors have applied millions of gallons of diluted spray to unwanted vegetation. In so doing, much has been learned regarding the necessary and desirable properties for a good herbicide formulation. Thus, any activity in which so many have participated, contributing various experiences, rapidly assumes a forbidding technical appearance to the uninitiated. Also, because of the great importance of this work, much highly developed technical research has necessarily been done by countless workers.

Accordingly, the purpose of this paper is to review critically the fundamental aspects of herbicide emulsifiable concentrates, in order to develop a clear understanding of the progress made in recent years.

To best accomplish this goal, we propose to discuss, point by point, the parameters directly concerned with the making of a quality herbicide formulation. These include:

1. What's in the can?
2. What is an emulsion?
3. How is an emulsion made?
4. What degree of emulsification is needed for proper brush control?
5. How much agitation is required for the emulsification of herbicide plus oil?
6. Can spray drift be minimized through use of a particular formulation?
7. Can the activity of herbicide be enhanced significantly by the formulation?

1. WHAT'S IN THE CAN?

Obviously, the primary constituent is the herbicide itself in a form that is assimilatable by the plant. The herbicide must be present in the amount and kind guaranteed by the label statement. This requires careful control of the manufacture from start to finish to insure that this will be so. Quality control of the formulation accomplishes this. In general, 2,4,-D and 2,4,5-T are sold as esters, and in brush control work, low-volatile esters such as the glycol ether esters are extremely effective and find wide use.

A second important ingredient in the formulation is the solvent. The purpose of the solvent is to act as a carrier for the herbicide and the emulsifier, so that correct emulsification or solution is obtained when diluted with water or oil at the time of use. The solvent has a man-sized job to do, when one considers that this job must be done properly at the time the package is opened, regardless of the previous history of that particular package. For example, a good brush killer must stand extremes of temperature in storage at zero degrees Fahrenheit or below without crystallizing, and yet be unaffected by summer storage at 125° F. or above—and this repeated for several seasons! A solvent capable of doing this is not chosen by whim, but only after careful research and evaluation. The physical characteristics of typical 2,4-D and 2,4,5-T ester solvents are shown in Table 1.

The emulsifier is the third important ingredient in the formulation, and is put there for the express purpose of dispersing the herbicide-carrying oil in the dilution water, so that homogeneous emulsions can be formed that adequately distribute the herbicide over the area to be sprayed. In addition to this service, the emulsifier present in the formulation is called upon to emulsify as much as ten gallons of added fuel oil per gallon of herbicide, in those situations where oil is a preferred additive. This is not all that is expected of the emulsifier; for when oil is used as the sole diluent, the emulsifier must not precipitate out of solution in the aliphatic diluting oil to gum up equipment and spray nozzles.

The solubility of an emulsifier in oil is quite important to good emulsification. In an article by Gladstone[2], he states that if an emulsifier is not soluble in oil, the solution will tend to be hazy. Upon standing, this haze will gradually settle out to a viscous layer, with the net result that the emulsification of the oil is impaired. This is explained by the fact that an emulsifier works best when it has both water and oil solubility.

Such emulsifiers represent much research and development

Table 1.

Physical Characteristics of Typical 2,4-D and 2,4,5-T Ester Solvents

Mixed aniline point, degree F.	52-82
Kauri-butanol value	79-98
Aromatics, %	80-100
Sp. Gr. at 68°F.	0.860-0.895
Flashpoint, °F. (C.C.)	81-164
Boiling range, °F.	274-386/290-495

effort on the part of formulators, and the specific materials used are reluctantly discussed, if at all. Suffice it to say, that emulsifiers commonly used today consist of various blends of non-ionic surfactants with anionic surfactants. However, those possessing all of the attributes listed here are not readily available.

2. WHAT IS AN EMULSION?

An herbicidal emulsifiable concentrate is essentially an oil mixed with an emulsifying agent. When we pour this oil, or emulsifiable concentrate, into water, we have to fight the old adage that oil and water just don't mix. When we mix the oil and water, we want that oil to break up into fine droplets and to be dispersed in the water. When finely divided oil droplets are dispersed (being a discontinuous phase) in the water (a continuous phase), we have what is called an oil-in-water emulsion. The oil has a random particle size, that is, some droplets are very fine while others are larger.

As the oil droplets become finer, the emulsion assumes a creamier appearance and becomes what is called a "tight emulsion." If these oil droplets become too large, they will rise to the surface of a water mixture and form an oily layer (this is of course assuming the oil is lighter than water). If all the droplets are fine enough, the droplets may remain in an emulsified form, but they may not stay in the same place. In other words, the emulsion may have a tendency to cream. When an emulsion creams, one can see two phases: A layer containing a high concentration of emulsified oil, and a region containing a much lower concentration of emulsified oil.

One comment is appropriate here as to why emulsions are made. Undiluted, an herbicide would have to be applied at approximately one drop of liquid per square foot. By emulsifying and diluting the herbicide, it is possible to spread finer droplets uniformly over the same area.

3. HOW IS AN EMULSION MADE?

The hardest system to emulsify is a gallon of herbicide extended with ten gallons of fuel oil and mixed with eighty-nine gallons of water. So, let us use this as an example of "how to make an emulsion." The order of mixing ingredients in such an emulsion is very important. The oil and emulsifiable concentrate should be premixed before the combination is added to the water.

It would be ideal if one could mix oil, concentrate and water in any order. Therefore, an actual experiment was devised to test the importance of the order of addition.

A Hardie Sprayer, mounted on a power wagon, was secured for this experiment. The sprayer had a one hundred gallon tank which was agitated vigorously with paddle and bypass agitation. One gallon of brush killer was added to eighty-nine gallons of water and then ten gallons of oil were added. The order of addition, then, was: Water, brush killer and then oil, each added separately. The solution received maximum agitation for several minutes, after which samples of liquid were taken from the top, middle and bottom of the spray tank. Figure 1 shows the oiling-out-rate of two prominent brush killer formulations. As you can see, oiling out is greatly increased when the oil is not premixed with the emulsifiable concentrate. This oil that rises to the surface has not had a chance to dissolve any emulsifier, and consequently, just doesn't emulsify. The bottom two lines show how much less oiling out occurs when oil and herbicide are premixed.

Therefore, for any herbicide-oil program, it is recommended that the user mix oil and herbicide first, then add this mixture to water. An excellent emulsion can be obtained in the following manner:

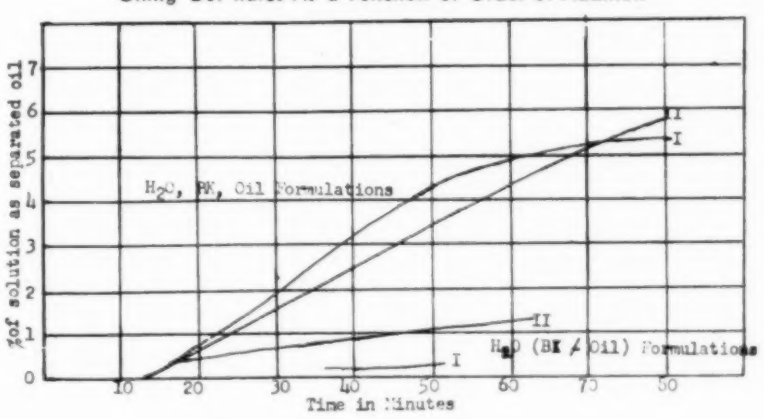
Start adding water to the spray tank. Immediately, add premixed oil and herbicide. Continue adding the rest of the water. In cases where bypass agitation alone is used, this procedure will yield excellent emulsions.

4. NOW, WE HAVE AN EMULSION MADE, BUT HOW GOOD AN EMULSION IS REQUIRED FOR GOOD BRUSH CONTROL?

For maximum brush control, we want the largest possible spray deposit on foliage for a given volume of spray. Ben-Amotz and Hoskins[1], way back in 1937, found that maximum oil deposit is obtained with merely a mechanical mixture of oil and water. As more and more wetting agent was added, deposit actually decreased.

Figure 1.

Oiling Out Rates As a Function of Order of Addition



These results have been explained by Gladstone [3]. A tight emulsion consists of oil surrounded by water. When water hits the waxy outer layer of a plant, water will tend to ball up and run off and the herbicide is lost. Also, laboratory tests show that if there is a lot of wetting agent present, spray deposit is minimized in that run off is reached with less spray. So, a tight emulsion results in less herbicidal spray deposit on a plant.

Conversely, in a relatively loose emulsion, when spray hits foliage, the oily portion of the spray drops out of the mixture and wets foliage with more of the active ingredient. The water can run off leaving an oily layer behind, resulting in better brush control.

Accordingly, many herbicide formulations are designed to give only adequate emulsification of the oil solution in water. The emulsions are relatively fast-breaking, so that when a spray hits foliage, maximum deposit may be obtained and consequently better brush control may result. The addition of wetting agents in the field may reduce spray deposit, though the leaf appears to be wetted better.

5. HOW MUCH AGITATION IS REQUIRED FOR THE EMULSIFICATION OF HERBICIDES PLUS OIL?

Based on what has been related so far, it can be seen that emulsification of oil plus herbicide is a hard job. Therefore, one needs agitation to break up and disperse the oily phase into the aqueous phase. Excellent emulsions can be obtained with either paddle or bypass agitation. Greater precautions must be observed, however, in making up emulsions using bypass agitation alone. The ratio of volume of solution through the bypass to spray tank volume should be high to achieve good dispersions. In other words, a high capacity pump is essential. Sufficient time should be allowed for the complete solution to pass through the bypass system several times—the chemical engineers tell us that six times are required.

The contractor who uses bypass agitation alone is confronted by a problem that the contractor who uses paddle agitation does not have. This problem is the homogeneity of the spray solution at the time of spraying. When the contractor sprays from a rig with bypass agitation alone, the volume of solution returning to the spray tank drops to a minimum. The spray solution is virtually without agitation. Now all emulsions on standing without agitation will separate into two phases—a concentrated and a dilute phase. The rate of separation will depend upon the manner of mixing ingredients, the hardness of the water, water temperature, and the extent of the agitation. This rate of separation will vary a great deal with every spray rig, and may cause variations in the concentration of herbicide of from ten to fifty per cent in the first ten minutes after agitation has stopped. Large concentration variations could have serious consequences in producing erratic results. Therefore, the contractor should insure himself that his method of operation results in homogeneous solutions. The contractor can do this very easily by taking samples of spray solutions from various sections of the spray tank at various time intervals. He should then observe the amount of phase separation in each sample to see how much variation he actually is obtaining in his mixing procedure.

It should be recommended that paddle agitation will assure homogeneous spray solutions. The contractor should be very careful in using bypass agitation alone.

6. CAN SPRAY DRIFT BE MINIMIZED THROUGH USE OF A PARTICULAR FORMULATION?

A problem that frequently arises in the use of herbicidal spray solutions is drift. Along highways and railroad rights of way, there are many areas that border highly susceptible crops, and one just does not dare spray normal herbicidal spray solutions for fear the wind will carry the herbicide into the susceptible crop area. A recent development of the chemical industry to combat drift is the use of invert emulsions.

Invert emulsions are, as the word indicates, the reverse of normal emulsions. They contain minute droplets of water dispersed in oil and are, therefore, called water-in-oil emulsions.

A special formulation is required for invert formation. A special emulsifier has to be used which favors the formation of an invert. Then, too, the order of addition of chemicals is different for invert formation. Here one adds the oil and herbicidal concentrate to a spray tank first. Then the water is added to the oil with good agitation. As more and more water is added and the percentage of water in the spray mixture gets higher and higher, the spray solution becomes thicker and thicker. It is possible to add a sufficient amount of water for the spray solution to obtain almost a mayonnaise type consistency. This is obtained when approximately 85% water has been added. This thick emulsion can be sprayed using appropriate nozzles. The high viscosity results in large spray droplets which are relatively unaffected by wind. Merely adding oil to conventional oil-water emulsions does not reduce drift.

Invert emulsions have several plus factors. These are: (1) that much larger herbicide deposits can be built up on foliage, and (2) that good deposits can be obtained in spite of wet foliage. It is interesting that these invert emulsions can actually be sprayed in the rain, and good brush control will result.

7. CAN THE ACTIVITY OF AN HERBICIDE BE ENHANCED SIGNIFICANTLY BY THE FORMULATION?

As is well known, the addition of oil to an herbicide has a significant effect on the activity of the herbicide. An oil program results in a faster more uniform brown-

(*Continued on Page* 105)

Liquid Fertilizers

By Samuel R. Aldrich*
Agronomy Department, Univ. of Illinois
Urbana, Ill.

LIQUID mixed fertilizers are now available to Illinois farmers. The relative roles of liquid and dry fertilizers depend upon:

1. Agronomic considerations
2. Cost of nutrients applied on the field
3. Availability of equipment to handle, store, and spread
4. Ease of handling

This discussion deals only with the agronomic factors, since the others can best be determined by the farmer for his own special situation.

It is the consensus for most farm situations in Illinois, liquid and dry mixed fertilizers may be assumed to be equal in performance. Where differences occur, they are not likely to consistently favor either form. Farmers may therefore select on the basis of cost per pound of nutrients from the dealer, plus special considerations in handling, storing, and applying the two forms.

Fundamentally, the nutrients are frequently similar in liquid fertilizers and dry mixed fertilizers of the same approximate analyses. There are several possible ways to supply the nitrogen in both liquid and dry mixed fertilizers, but in the final product as used by the farmer, the nitrogen occurs as an ammonium salt, urea, cyanamide, or nitrate. Some fertilizers, both liquid and dry, contain all three forms. There is no special advantage of either liquid or dry fertilizer with respect to forms of nitrogen.

The *phosphorus in liquid fertilizers* is supplied entirely by phosphoric acid and is neutralized by the ammonium hydroxide of the nitrogen source (for example, ammonia (NH_3) in water produces ammonium hydroxide, which neutralizes the acidity.) The phosphorus thus occurs as ammonium phosphate and is therefore all water soluble. The significance of water solubility is fully explained in SF-48*.

*Fact sheets SF-6 and SF-48 are available from the Department of Agronomy, University of Illinois, Urbana.

The *phosphorus in dry mixed fertilizers* is the result of treating phosphate rock with sulfuric, or nitric acid. This in turn may be ammoniated to different levels of nitrogen. A still newer process, patented in 1958, involves hydrolyzing calcium metaphosphate so that it may be ammoniated. Thus, the phosphorus in dry mixed fertilizers may be in several forms differing mainly in their water solubility. The water solubility ranges from about 10 to nearly 100 percent. Whether or not this is significant in the field depends upon several factors explained in SF-48.

High water solubility is not an advantage for broadcast applications. Triple superphosphate and ordinary superphosphate are about as high in water solubility as liquid fertilizers.

The potassium in liquid and dry fertilizers is in the same form, muriate (potassium chloride, KCl). A small amount of sulfate of potash is available, but the potassium chloride form supplies most of the potassium in the United States.

Availability in Dry Soil

It may at first thought seem logical to expect that nutrients which are supplied in liquid rather than dry form would be more readily available in a dry soil. In practice there is not likely to be a measurable difference. The water in liquid fertilizer, when put on an acre basis, is negligible. Dry fertilizer absorbs moisture and goes into solution unless the soil is very dry. Liquid fertilizer, on the other hand, would soon lose moisture and crystallize out in a very dry soil.

No practical difference in rate of availability is expected in a moist soil, because a significant amount of the water-soluble nutrients in a dry fertilizer will go into solution within a matter of hours, or at most a few days.

With *presently available materials*, the possible range in ratios is somewhat more limited with liquid fertilizers than with dry fertilizers. All liquid fertilizers carry some nitrogen, because ammonia is used to neutralize highly corrosive phosphoric acid. It is not necessary in dry fertilizers.

Higher analyses are possible in dry than in liquid fertilizers. The practical limit of $N+P_2O_5+K_2O$ in liquid mixes has been about 32 per cent before "salting out" (crystallization) occurs—if the temperature falls to the freezing point

(*Continued on Page* 104)

*Presented at the Illinois Custom Spray Operators School, January 28-29, University of Illinois, Urbana, Ill.

Ammoniation . . .

By W. W. Harwood
International Minerals & Chemical Corp.
Bartow, Fla.

This report was presented at the Fertilizer Industry Round Table, November 5-7, 1958, Washington, D. C.

THE phosphatic materials reviewed in this discussion are normal or ordinary superphosphate, triple superphosphate made from "wet process" phosphoric acid and phosphoric acid, both "wet process" and electric furnace. These materials represent the large majority of phosphate-bearing materials used in mixed fertilizer manufacture and are those phosphates involved in the ammoniation reactions.

Ammoniation of phosphatic materials in the manufacture of mixed fertilizers is, in reality, a series of chemical reactions between the uncombined ammonia added and the acidic components of the phosphatic materials, originally present or formed during the reaction steps. In this paper, the term "ammoniation rate" is used to denote the pounds of anhydrous ammonia *absorbed* per unit or per 20 pounds of available P_2O_5, even though the term is commonly used in the fertilizer industry to refer to the pounds of ammonia *added* per unit of available P_2O_5. Since the "theoretical maximum" ammonia absorptions do not conform to those rates which can be achieved in actual operations, it was decided to treat this subject in three phases. These are: 1. Chemical or theoretical reactions. 2. Influences of physical factors. 3. Operational factors.

I. Chemical or theoretical reactions

A. *Superphosphates*

The approximate percentage compositions of superphosphates are given in Table 1. The ammoniation reactions are based only on the water soluble phosphates, namely phosphoric acid and mono-calcium phosphate. However, a small amount of additional ammonia may react with the citrate soluble-water insoluble phosphates. The calcium sulfate does enter into the ammoniation reactions by providing the calcium to combine with the phosphate, thereby permitting the ammonia to combine with the sulfate. The presence of the calcium sulfate in large quantities in normal superphosphate is the reason that normal superphosphate has a higher ammoniation rate than triple superphosphate has.

The accepted principal reactions that take place in the ammoniation of superphosphate (1, 2, 3) are given in the order in which the reactions are believed to occur:

For normal and triple superphosphates

(1) $H_3PO_4 + NH_3 \rightarrow NH_4H_2PO_4$

(2) $Ca(H_2PO_4)_2 \cdot H_2O + NH_3 \rightarrow CaHPO_4 + NH_4H_2PO_4 + H_2O$

For normal superphosphate

(3) $2CaHPO_4$ (from reaction 2) $+ 2NH_3 + CaSO_4 \rightarrow Ca_3(PO_4)_2 + (NH_4)_2SO_4$

(4) $NH_4H_2PO_4$ (from reactions 1 & 2) $+ NH_3 + CaSO_4 \rightarrow CaHPO_4 + (NH_4)_2SO_4$

(5) $2CaHPO_4$ (from reaction 3) $+ 2NH_3 + CaSO_4 \rightarrow Ca_3(PO_4)_2 + (NH_4)_2SO_4$

For triple superphosphate

(3) $2CaHPO_4$ (from reaction 2) $+ 2NH_3 + CaSO_4 \rightarrow Ca_3(Po_4)_2 + (NH_4)_2CO_4$

(4) $NH_4H_2PO_4$ (from reactions 1 & 2) $+ NH_3 \rightarrow (NH_4)_2HPO_4$

(5) $3\,CaHPO_4$ (from reaction 2) $+ 2NH_3 \xrightarrow{>40°C} (NH_4)_2HPO_4 + Ca_3(PO_4)_2$

Based on the average chemical compositions of the representative superphosphates given in Table 1, the calculated stoichiometric or "theoretical maximum" pounds of ammonia absorbed per unit of available P_2O_5 for each reaction are as shown in Table 2.

Reactions 1 and 2 which take place very rapidly are the reactions between the ammonia and the water soluble phosphates, namely phosphoric acid and monocalcium phosphate. Reaction 3 involving the dicalcium phosphate from reaction 2, ammonia and some calcium sulfate results in a small loss of availability of the P_2O_5, since precipitated tricalcium phosphate is only partially available, approximately 80%. The ammonia absorption in this reaction is much larger for normal super than for triple super, since the calcium sulfate necessary for the tricalcium phosphate formation is in much greater abundance in normal superphosphates. It was pointed out by White, Hardesty and Ross (2) that no appreciable additional tricalcium phosphate is formed until an ammonia absorption corresponding approximately to reaction 5 is reached, at which point the majority of the phosphate would be in this form. With the ammoniating equipment in use, it is impossible to achieve the maximum ammoniation rates shown in reaction 5, since this maximum degree of ammoniation can be approached only by prolonged treatment with ammonia at temperatures and pressures that

Table 1. Percentage Composition of Superphosphates.

	Normal	Triple
Monocalcium phosphate, $Ca(H_2PO_4)_2 \cdot H_2O$	23-30	63-73
Citrate soluble-water insoluble phos., including dicalcium phosphate, iron and aluminum phosphate complexes	5-9	13-18
Calcium sulfate, $CaSO_4$	45-50	3-6
Silica, fluosilicates, organic matter, unreacted rock, etc.	8-12	5-10
Free moisture	3-6	3-6

A DISCUSSION OF AMMONIATION RATES, USING ANHYDROUS AMMONIA WITH SEVERAL PHOSPHATIC MATERIALS

are impossible to attain economically in processing equipment. There is a linear decrease in the water solubility of the P_2O_5 of normal superphosphate with increases in ammoniation rates; while under the same conditions, the water solubility of the P_2O_5 of triple superphosphate levels off between 50-60%, when expressed as % of available P_2O_5 in the original material (3, 4).

B. *Phosphoric Acids*

The reactions that take place in the full ammoniation of phosphoric acid are:

(1) $H_3PO_4 + NH_3 \rightarrow NH_4H_2PO_4$

(2) $NH_4H_2PO_4 + NH_3 \rightarrow (NH_4)_2HPO_4$

(3) $H_2SO_4 + 2NH_3 \rightarrow (NH_4)_2SO_4$

Based on 54% P_2O_5 acid (75% H_3PO_4 for furnace acid and 67% H_3PO_4 and 2.5% H_2SO_4 for wet process acid), the "theoretical maximum" pounds of ammonia absorbed per unit of available P_2O_5 for each reaction are shown in Table 3.

The remaining P_2O_5 in wet process acid is present as iron and aluminum phosphates, which are available according to AOAC methods and are beneficial in granulation processes.

II. Influences of Physical Factors

The effects that the physical properties and moisture of the superphosphates have upon their ammonia absorption were covered very completely by Kumagai, Rapp and Hardesty (4) when anhydrous ammonia is used as the only source of ammonia. For this work, a bench-scale laboratory rotary ammoniator was used with a period of four minutes allowed for ammoniation and mixing.

1. *Porosity*
   Superior ammonia absorptions were obtained with superphosphates containing soft and porous particles than with phosphates containing hard and dense particles. Porosity is probably the most important physical property that affects ammoniation.
2. *Particle size*
   When materials of the same porosity were tested, ammonia absorption increased as the particle size of the superphosphate was decreased from 5 to 80 mesh.
3. *Initial moisture content*
   Ammonia absorption increased as the free moisture content was increased from 1% to 7%. Conclusion was that the desired moisture content should be 3-6%.

In addition to the influences of the physical characteristics upon ammoniation, they showed the effects of reaction temperatures and reaction time.

1. *Reaction temperature*
   The reaction temperature for normal superphosphate is not important; however, increases in the reaction temperature for triple superphosphate resulted in increases in ammonia absorption. Optimum temperature appears to be near 212°F.
2. *Reaction time*
   Every chemical reaction requires time; therefore, the minimum reaction time for efficient ammoniation should be not less than 3 minutes.

III. Operational Factors

Even though it is neither practical nor economical to ammoniate phosphatic materials at the "theoretical maximum" ammoniation rates, as previously discussed, the following operational factors (5, 6) must be considered in order to obtain maximum ammoniation rates with minimum nitrogen losses. These factors must be established for a particular plant using specific equipment and then controlled accordingly.

1. Correct formulations, in order to have the proper reaction mixtures possessing the following and avoiding any possibility of excessive plasticity:
   a. Properly sized raw materials with maximum porosities.
   b. Adequate moisture content and controls.
2. Proper control of physical conditions through correct selection and operation of ammoniating equipment in order to obtain:
   a. Homogeneity of mixing.

(*Continued on Page* 103)

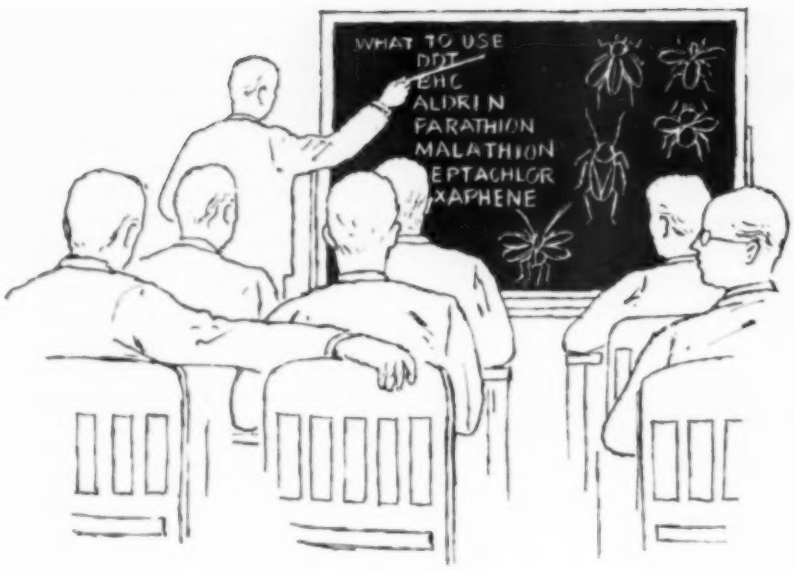
Table 2

	Normal superphosphate		Triple superphosphate	
Reaction No.	Increment	Summation	Increment	Summation
1	.6	.6	0.3	0.3
2	1.9	2.5	2.0	2.3
3	1.9	4.4	0.5	2.8
4	2.5	6.9	2.2	5.0
5	2.5	9.4	1.0	6.0

Table 3

	Furnace Acid		Wet Process Acid	
Reaction No.	Increment	Summation	Increment	Summation
1	4.8	4.8	4.3	4.3
2	4.8	9.6	4.3	8.6
3	—	—	.3	8.9

be applied unless the user wears



What should the

THE dealer who handles insecticides has a difficult job these days. New insecticides have been appearing on the market in large numbers for the past dozen years, and the dealer is constantly called upon to recommend materials for the control of a wide variety of insect pests. He is expected to know all the answers, and to carry an adequate stock of every type insecticide used to control the pest which may occur in his geographical area.

This is a pretty tall order. The official list of recognized pesticides now includes (as of August, 1958) some 106 different materials. Some of these are fungicides and herbicides, but 64 can be classed as insecticides or miticides. These 64 basic materials are put on the market in a variety of ways by a large number of manufacturers and formulators. To count the trademarked insecticides on the market would be difficult, because the number fluctuates from year to year, but it certainly exceeds 10,000 at any given time.

At this point the dealer may be inclined to throw up his hands in horror, and resolve not to stock *any* insecticides, since the field is so complex. Fortunately, there is a bright side to the picture. It is not necessary for the average dealer to be an expert entomologist, nor does he need to stock a tremendous number of items in order to service his customers' needs. By knowing how and where to obtain pertinent information on insecticides, any dealer can operate a successful and highly profitable insecticide business, whether his main line be farm machinery, hardware, garden supplies, drugs, or other related fields.

It is the purpose of this review to furnish a few guideposts for the dealer to enable him to answer most of his customers' questions. Since the field is changing so rapidly and is so complex, it is not practical for the dealer to memorize recommendations; it is much more important for him to know where information can be secured, and to have it available.

Classes of Insecticides

INSECTICIDES may be classified into five groups or families on the basis of their chemical nature. Each group has certain characteristic properties, and while no attempt will be made to list all members in each family, the more important ones will be mentioned.

The oldest family of insecticides includes the inorganic compounds. These were the first chemical compounds prepared specifically for the control of insects, and include the arsenicals and the fluorine compounds. Among the arsenicals are calcium arsenate, lead arsenate, and Paris green. The inorganic compounds of fluorine include such materials as sodium fluoride and cryolite. With the advent of the newer synthetic organic insecticides the use of these inorganic compounds has been greatly curtailed, but the dealer will have occasional calls for them.

The family of botanical or plant insecticides includes nicotine, a very toxic material, and pyrethrum, and rotenone, which are relatively low in toxicity to higher animals, but which are excellent insecticides. Nicotine has been supplanted in large measure by the newer contact insecticides, and is in much the same class as the arsenicals as far as customer use in concerned. Pyrethrum is seldom used alone, synergists normally being used with it to increase its effectiveness. It is an excellent "knock down" agent and is the basis for many household fly and mosquito sprays and aerosols. Ro-

dealer know about Insecticides?

by Donald Frear

Professor of Agricultural and Biological Chemistry
The Pennsylvania State University, University Park, Pa.

tenone is still the preferred insecticide for the control of many insects attacking vegetables in the home garden, because of its low toxicity.

The family of fumigants is of minor interest to the average dealer, but in some agricultural areas there may be a demand for grain bin fumigants. These are usually methyl bromide, or combinations of carbon tetrachloride, carbon disulfide, ethylene dibromide and ethylene dichloride. Methyl bromide is also used for seed bed fumigation. For household use to destroy clothes moths and carpet beetles, paradichlorobenzene is widely used. Soil fumigants, such as chloropicrin, chlorinated propanes (DD), and others are used in some areas, particularly in the south for control of soil insects and nematodes.

Nematocides today are one of the fastest growing branches of the pesticide field, and there is a rapidly expanding market for such materials as Nemagon and Terraclor which have proved effective in controlling nematodes.

Among the newer synthetic organic insecticides which have been developed over the past twenty years, the family of chlorinated hydrocarbons is probably still most important. DDT, oldest member of this family, is still widely used for the control of many agricultural insects, although houseflies and certain other insects have become resistant to it. Methoxychlor and TDE (DD), closely related to DDT, are less widely used, and are usually considered special-purpose insecticides. Aldrin, dieldrin, heptachlor, endrin, and chlordane are chemically related, and are used for the control of many species of insects on fruits, vegetables, and on other crops. Chlordane has been particularly useful for the control of ants, and heptachlor is widely recommended against forage insects. Benzene hexachloride (BHC) and one of its isomers, lindane, are applied to certain fruits and vegetables growing above ground. Because of its pungent and persistent odor, BHC should be used with caution on food crops. Toxaphene will control cutworms, lice on livestock, and other insects.

The newest family of insecticides is the organic phosphate group. This includes several extremely toxic compounds, such as TSPP (tetraethyl pyrophosphate) and parathion which should not be applied unless the user wears a protective respirator or mask. Guthion, one of the newer phosphate compounds, appears to control most pests attacking pome and stone fruits. Diazinon and Dipterex are used in baits and sprays for housefly control in farm buildings, and usually give satisfactory control of DDT-resistant flies. One of the most widely useful of this family of insecticides is malathion, which combines excellent control of a wide range of insects with low toxicity to man and higher animals.

Space does not permit the mention of many other useful insecticides. Information on others may be obtained from the sources described in the following sections.

Sources of Information

Research and Extension Publications.

The State College or University can be one of the best sources of information on pesticides. In practically all states the Agricultural Extension Service and the Agricultural Experiment Station publish bulletins and circulars covering recommendations for the control of insect pests prevalent in your state. These publications are available without charge to residents of the state, and may be obtained by writing to the State Agricultural College.

In many states, local County Agricultural Agents can supply dealers with publications on insect control recommendations for the area. In addition to supplying literature, the County Agricultural Agent is a good man to know. He is a resident of the county, and is familiar with local conditions. He knows the local insect problems, and frequently is in a position to give advice on the types of formulations of insecticides likely to be in greatest demand in the area—a valuable aid in planning purchases and controlling inventory.

In addition to state publications there are many excellent bulletins and circulars published by the U. S. Department of Agriculture. A list of available publica-

tions in the insecticide field may be obtained from the Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Trade Magazines.

Magazines offer an excellent means for keeping up-to-date on new developments in the insecticide field. Every dealer should subscribe to at least one trade magazine, and read each issue carefully. In addition to technical information on new products, magazines frequently carry valuable articles on merchandising and give other suggestions to assist you in conducting your business.

Commercial Literature.

All reputable insecticide manufacturers publish leaflets and booklets on their products, supplementing the abbreviated information on the product labels. While these are partly promotional in nature, they contain much valuable information on how, when and where to use a specific product to the customer's best advantage. Distributors of insecticides are always ready to supply literature on the products they sell, and the dealer should request an adequate supply of this material with each order placed with the wholesaler. The more elaborate booklets and brochures are expensive to print, and are often offered as an inducement with orders of a stated maximum value. Whenever possible the dealer should take advantage of such offers, for the descriptive text and pictures in this type of publication are often superior to those found in textbooks. A careful study of the better types of commercial leaflets will give the average dealer the equivalent of a short intensive course in entomology and insect control. It will furnish the background information which will enable him to answer most general questions.

Labels.

For the dealer who takes the time to read them, the labels on insecticides can be most informative and will provide the specific answers to most questions. A good label will state all the following:

1. What the product contains (active ingredients).
2. What the product is good for. (A list of insects controlled).
3. Where, how, and when to use the product for the best results.
4. Hazards (if any), with precautions for use of the product.

Thus the label, by itself, will answer many of the customer's questions *if it is read carefully*. The dealer should also caution the user to follow the label directions *to the letter;* failure to do so may cause poor results, or even injury to plants, animals, or human beings.

Most insecticide labels will contain detailed directions for the use of the product, including the amounts to use and when to use it. If the insecticide is toxic, the label will show the time interval which should elapse between application and harvest of the crop. This specific time interval, which may vary from one to thirty or more days, has been carefully worked out to insure that the insecticide residues at harvest shall not exceed the permissible levels which have been worked out to safeguard public health. These permitted residue levels, usually called *tolerances*, are established by the Food and Drug Administration, and must not be exceeded if the crop is to be marketed.

Precautionary statements on insecticide labels include warnings as to possible hazards in handling, mixing, and applications. Many insecticides are relatively non-toxic and may be handled without special precautions, while others are highly toxic to man and animals and should be treated with great respect. When using the more dangerous insecticides it may be necessary to wear a respirator and/or protective clothing. Specific statements on the hazards involved and how to avoid them should always be read carefully, and called to the attention of the customer. Today, with many insecticides available, it is usually possible to select one with a minimum of hazard. Particularly for home garden use, the dealer should weigh the factor of safety very carefully in making recommendations, and should avoid the more highly toxic compounds.

Conclusion

Since the field of insecticides has become so highly complex, and so many products and formulations are being offered each year, it is suggested that the dealer familiarize himself with good sources of information, rather than attempting to memorize chemical or trade names. The sources of information are: the County Agricultural Agent, state and Federal publications, trade magazines, commercial literature, and product labels. It is suggested that every dealer accumulate a small working library of pertinent publications on insecticides to assist him in answering customer questions.★★

HANDBOOK OF AGRICULTURAL PEST CONTROL

by

S. A. Bailey and L. M. Smith

CONTENTS

The Commercial Agricultural Chemicals
Physical and Chemical Properties
Compatibility
Containers
Fumigants and Fumigation
Toxicology and Residues
Spray Oils and their Properties
Spraying Machines
Rates of Delivery of Spray Machines
Rates of Application for Sprays
Dusts and Dusting
Aircraft
Mosquito Control
Hazards
Miscellaneous Topics
Tables and Formulas
Terms and Symbols

184 PAGES $3.25 in U. S. A.

Send check with order

INDUSTRY PUBLICATIONS, Inc.

P.O. Box 31 Caldwell, N. J.

Measurement of Flow of Phosphoric Acid and Nitrogen Solutions

*by W. E. Jones**
Northwest Cooperative Mills
St. Paul, Minnesota

IN the transformation of the fertilizer industry from a pure mixing operation to a chemical processing industry, one of the more difficult problems encountered is that of the flow measurement of various liquids employed in modern fertilizer technology. In this category also fall those compressible gases which are metered as liquids. The more common of the materials referred to are the ammoniating solutions, anhydrous ammonia, various acids and water.

There are several types of metering devices available to make such measurements, some of which have been discussed in previous "Round Table" meetings. One which has not been previously discussed is the positive displacement type meter.

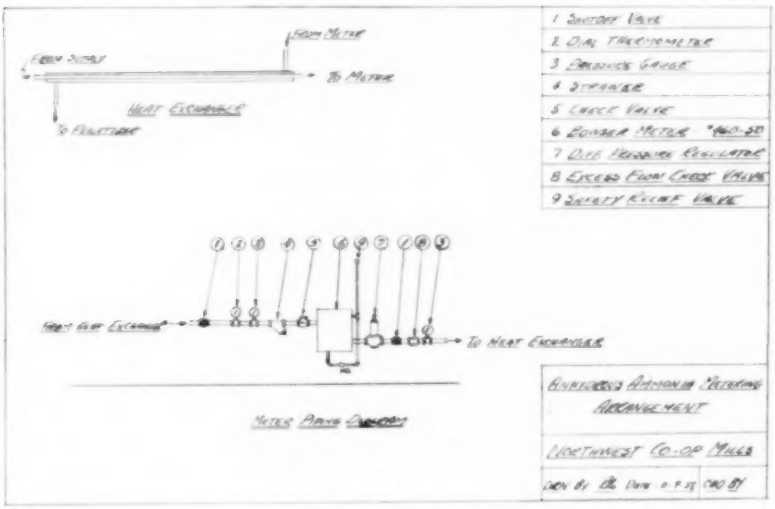
In its simplest form, the positive displacement meter would consist of a single unit of definite volume which would be alternately filled and emptied. A nonmechanical version would be somewhat like filling a container, such as a quart milk bottle, and then emptying it, keeping track of the aggregate total. Since this is not conducive to continuous processing, a meter such as the Bowser employs an arrangement of pistons wherein the total flow is an accumulation of measured increments which can be totalized by means of a simple counter. An indication of instantaneous rate of flow is available by adding a synchronized generator to the meter shaft, having it power a volt meter which is calibrated in the desired units of flow.

The use of this type of meter has appealed to us because of the few variables which affect its metering accuracy and versatility. Basically, all that is needed to maintain accuracy is a specific gravity–temperature curve for the the material to be measured. In the piping to the meter, a direct reading thermomoter can be inserted to supply the operator with the operating temperatures. The operator can be supplied a curve which will allow him to make the necessary operational corrections.

The meter can be calibrated with water into a weighed or measured receiver and the result plotted. This should be done at various rates of flow. If the plot does not fall in a straight line, it indicates the meter is out of calibration, which can be corrected by a simple adjustment on the meter. This type of meter is equally accurate for all rates of flow which is the marked difference between this type and the area type meter, such as the rotameter whose measuring characteristics do not fall in a straight line and are therefore much more difficult to calibrate.

Thus far, we have used Bowser type positive displacement meters to measure flows on phosphoric acid and anhydrous ammonia. We have a good comparison of efficiency in metering anhydrous ammonia, since one of our operations employs rotameters and the other a positive type displacement type meter. The losses on the positive displacement type meter are 30% less in essentially the same type operation. I have prepared a drawing of our anhydrous piping arrangement which is available for any so desiring.

During the 1957/58 fiscal year, we metered in excess of 6,500 tons of wet process phosphoric acid through two Bowser meters and spent less than $10.00 for service, repair or calibration after the initial one. The meters were examined during last August and found to be in excellent condition. Our losses on this material were well within what we consider normal.



*This discussion on metering liquid raw materials in fertilizer manufacture was presented at the Fertilizer Industry Round Table, November 5-7, 1958, Washington, D. C.

Correction Factor for

AREA-TYPE FLOW METERS

The following is a discussion on the calculation of a correction factor for changes in specific gravity, for an area-type flow meter. It was presented by Albert Beehler before a meeting of fertilizer plant men at the Fertilizer Industry Round Table, held November 5-7, 1958 in Washington, D. C.

PRACTICALLY all plant men have at one time or another, had occasion to correct an Area Type Flowmeter or Rotameter for changes in the specific gravity of the fluid being measured. This usually is desirable where a variety of ammoniating solutions and acids is used. A few of you were probably puzzled enough to call your local sales engineer, who willingly gave you a correction factor over the telephone. But most of you, I would be willing to venture, calculated this correction factor yourselves by taking the ratio of the new specific gravity divided by the old specific gravity. You were then puzzled to find that the resultant flowmeter settings did not produce a good analysis on your next run. The purpose of my comments is to show why this type of correction did not produce the desired results, and to provide information which will allow you to calculate these factors accurately when desired.

In the variable-area meter, you certainly all know that the free float is actually immersed in the flowing fluid. It is the resolution of the downward force created by the float weight minus the buoyant effect of the fluid pushing upward and the upward force created by the velocity of the moving fluid that actually positions the float to a specific position in the tube proportional to flowrate. Thus, a change in fluid density without any change in flowrate will cause a repositioning of the float, because the buoyant force has been altered. For convenience, the correction factor may be expressed as follows:

$$W_1 = W_2 \sqrt{\frac{(P_f - P_1)\ P_1}{(P_f - P_2)\ P_2}}$$

W_1 = new flow rate (in weight units) (actual)
W_2 = old flow rate (in weight units) (indicated)
P_f = float density (grams per cubic centimeter)
P_1 = new fluid density (grams per cubic centimeter)
P_2 = old fluid density (grams per cubic centimeter)

Substituting some numbers in this formula, let's assume for a moment that we have a meter with direct reading scale, maximum 5,000 PPH of ammonia solution, whose specific gravity was 1.06 and we have decided that for this particular run, we are going to use a solution, whose specific gravity is 1.14—then the correction factor would be 1.03—
thus, the 5,000 PPH setting on the flowmeter would be equivalent to 5,150 PPH of the heavier solution.

$$W_1 = W_2 \sqrt{\frac{(P_f - P_1)\ P_1}{(P_f - P_2)\ P_2}}$$

$$\text{or } W_1 = 5{,}000\text{PPH} \sqrt{\frac{(8.02-1.14)\ 1.14}{(8.02-1.06)\ 1.06}}$$

$$W_1 = 5000 \times 1.03$$

$$W_1 = 5150 \text{ PPH}$$

It is important here that this formula for correction be used only for variable area type meters of the free float type. On occasion, it will be necessary for corrections to be made to another type of flowmeter, namely, the magnetic one on wet process phosphoric acid service. In this obstructionless type meter, there is no float in the moving fluid stream, and therefore, the correction factor is merely the ratio of the specific gravity in direct relationship. This is a quite common correction, since all magnetic meters are true velocity meters measuring volume. Therefore to put the calculation on a weight basis you must know your average specific gravity of the phosphoric acid during the period in question.

It has been my company's practice on solution and acid flowmeters and controllers to provide the meter scale direct reading in PPH of liquid, specific gravity 1.0 with suitable correction factors stamped on a metal tag on the instrument door for all of the various solutions which might be used. Thus, the necessity for figuring these correction factors has been reduced to the bare minimum.

The Vapor Problem in Measurement

During a period of discussion following the report by Mr. Beehler, Round Table participants reviewed the question of how to handle the vapor problem in connection with the positive displacement measurement of anhydrous ammonia.

It was observed that an error in metering would result through the measurement of the gases or the air that might be entrained in the liquid.

One company solving this problem, connects to the inlet side of the meter a line back to the storage tank, in which the volume of flow is controlled through an orifice. The top chamber of the meter is designed in such a way that gases coming into the meter are trapped, and dispensed through a circulating line back to the storage tank.

The diagram, page 47, shows use of a heat exchanger in conjunction with a positive displacement meter to control vaporization prior to metering. In this arrangement,

(*Continued on Page* 98)

HERE'S A FAMILIAR SIGN OF U.S.I. SERVICE TO MIDWEST FERTILIZER MANUFACTURERS

If your fertilizer plant is located in the Midwest, you've seen many a U.S.I. tank car in freight trains speeding across the countryside. The traditional U.S.I. oval is a familiar symbol of dependable, prompt service from our three plants in your area.

Now our new color-coded domes let you identify the product in the tank car at a glance:

Ammonia (Bright Yellow). U.S.I. ships Anhydrous and Aqua Ammonia from its Tuscola, Illinois plant.

Nitrogen solutions (Bright Red). The Tuscola plant supplies 16 different nitrogen fertilizer solutions, including urea types, to meet a variety of formulation requirements.

Phosphatic fertilizer solution (Bright Orange). Tuscola produces P_2O_5 in the form of PFS (wet process phosphoric acid, 52-53% P_2O_5). With U.S.I.'s PFS, you can frequently cut costs for regular and special granular grades . . . and make higher analysis goods as well.

Sulfuric acid (Black). U.S.I. produces all concentrations of sulfuric, including oleum, plus good spent acid of fertilizer quality at three points: Tuscola; Sunflower, Kansas; and Dubuque, Iowa.

Prompt deliveries are as traditional with us as our U.S.I. oval. So is technical assistance on equipment, materials, formulations – any problem involving production and costs.

For basic fertilizer chemicals or for help in using them, contact Heavy Chemical Sales, U.S.I. – New York office. Write or call collect – OXford 7-0700.

U.S. Industrial Chemicals Co.
Heavy Chemicals Sales Dept.
99 Park Avenue, New York 16, N. Y.

Please place me on your mailing list to receive future information on U.S.I. heavy chemicals.

Name_____

Position_____

Company_____

Address_____

City_____ State_____

☐ I'm a fertilizer manufacturer

☐ I manufacture _____

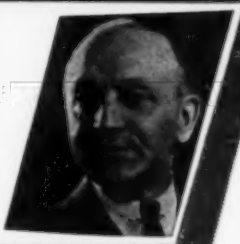
I use – or plan to use:

☐ Ammonia, Nitrogen Solutions

☐ Phosphatic Fertilizer Solutions ☐ Sulfuric Acid

U.S.I. INDUSTRIAL CHEMICALS CO.
Division of National Distillers and Chemical Corporation
99 Park Avenue, New York 16, N. Y.

Fertilizer Views and News



By Vincent Sauchelli

Dr. Sauchelli is Chemical Technologist for National Plant Food Institute.

Explaining Concepts of Statistical Techniques in Control

"THAT lab must be wrong! I know we didn't change anything in the plant. That sample they used must be way out of line. We'll send them a repeat sample and see what they get."

Such comments about the chemical control laboratory are not rare. Production people have grave misgivings at times about the accurary of the chemical analysis. The doubting plant man very frequently will send one or more repeat samples taken from either a reserve of the original batch or from a resampling of the lot. Then what happens? If the results on the second sample concur with the first the plant man unconvincedly accepts them; if the second analysis, unlike the first, shows the material is within specifications he feels reassured in his own judgment about the control "lab's" undependability.

We have already pointed out in this column that the control laboratory is not infallible; that it has serious problems which defy the supervisor's ingenuity to solve without the aid of statistical techniques. Variation is the major cause. Variability in materials, sampling techniques, laboratory equipment and personnel can frequently, in their totality, outweigh the variation in the process. Armed with statistical quality control procedures, the problem can be analyzed and errors corrected.

The statistician uses simple frequency distributions and control charts to demonstrate and control the accuracy and reproducibility of chemical and physical tests.

The supervisor of the plant's chemical control laboratory is expected to be familiar with the various major steps in production. He often participates with the operating man to establish the fertilizer formulations. These are set to accord with a specified analysis within close limits: An upper limit reflecting management's costs; a lower limit set by the state fertilizer regulations.

The control chemist has to recognize that in producing a mixed fertilizer it is impossible to avoid variations and biases as pointed out in a previous paragraph. These major sources of variation in production are closely analagous to similar sources in the laboratory. This parallelism is shown in the following:

Laboratory	*Process*
Reagents	Raw materials
Glassware and instruments	Equipment
Chemical analysts and technicians	Operators
Sampling	Sampling
New analytical procedures	New operating methods

Although the chemist always tries to perform his function with a high degree of accuracy and reproducibility, he often is faced with problems which he cannot solve by his routine procedures. This is where the modern techniques of statistical control can help.

Frequency distributions

The frequency distribution diagram is one of the tools used in studying the accuracy of a routine chemical or physical test. All statistical quality work has to do with measurements of one kind or another. The number of measurements may be large, and unless they are organized, they could be very confusing and difficult to analyze to determine their significance. Statisticians tabulate the measurements in groups, and note the number of frequencies that make up each group. Next they make a picture of the group data in the form of a graph, which at a glance indicates the nature and extent of the observed variations in the measurements. In the majority of cases, the grouped data follow a normal bell-shaped curve.

Two quantities are most helpful in this assemblage of data and comparison of two sets of data: (a) the number around which most of the data cluster, called the mean; and (b) some number which represents the spread of dispersion of the data, called the standard deviation or sigma. The mean is the arithmetic average, that is, the sum of the individual measurements divided by the number of such measurements. The standard deviation is defined as the square root of the mean of the squares of the deviations from the mean of the group.

Another measure of dispersion is the range which is measured by subtracting a smaller from a larger value. The range is used when the number of measurements is relatively small.

Standard deviation is the most powerful method for calculating the measure of dispersion. As stated previously, it is not possible to

(*Continued on Page* 102)

The AGRICULTURAL Applicator

- Weed Control On Roadsides and in Fencerows
- Texas Applicator Offers Prompt Service & Results
- Two Schools For Agricultural Applicators

THE NEW GRUMMAN AG-CAT

The Most Practical and Economical Agricultural Airplane

The C.A.A. Certified Ag-Cat, designed specifically for dusting and spraying, is certificated for a 1200 lb. hopper load with a 220 hp Continental. It converts from dusting to spraying in minutes. All rigging is external. All components easily accessible. Ailerons and wing panels are interchangeable. Metal surfaces are corrosion-proofed with Furan. The cockpit, harness and belt are stressed for 40-G's. The nose slopes for better visibility. The stick forces are light and the airplane stalls like a lady. These and a dozen other outstanding features on the Grumman Ag-Cat add up to a more profitable operation for you. Ag-Cats for flight and field testing are at distributors.

SPECIFICATIONS

Wing span	35 ft. 8 in.
Over-all length	24 ft. 4 in.
Maximum height	10 ft. 9 in.
Maximum gross weight	3700 lb.
Fuel	34 gal.
Oil	5 gal.
Hopper capacity	29 cu. ft. (217 gal.)
Hopper load restriction	1200 lbs.

PERFORMANCE

Normal working speed	75 mph
Take off distance @ 3700 lb.	750 ft.
Rate of climb @ 3700 lb.	500 fpm

GRUMMAN AG-CAT

GRUMMAN AIRCRAFT ENGINEERING CORPORATION
Bethpage • Long Island • New York

U. S. DISTRIBUTORS

Magnolia Aviation Co.
Laurel Airport
Box 683
Laurel, Mississippi

United Heckathorn Co.
600 South 4th St.
Richmond 4, California

Sun Valley Dusting Co.
P. O. Box 1671
San Benito, Texas

Mid Continent Aerial Sprayers & Dusters Inc.
Hayti, Missouri

Left: A skid-mounted sprayer on the rear of a pick-up truck for weed control on a secondary road.

Below: A state highway department truck is used to spray herbicides beside a main highway in Connecticut.

Roadside Weed Control

A BEAUTIFUL highway, well engineered and constructed, properly sloped and drained, well grassed, and free from weeds and brush, is the fond dream of every highway maintenance engineer. While county, trunk, and local roads are not built on nearly so ambitious a scale as this, the aim of every county still is to give the taxpayers full value.

The average Iowa county, for instance, has some 1,000 miles of county, trunk, and local roads. Figuring one rod from the edge of the road to the adjacent fence (minimum distance) would mean 320 linear rods, or two acres, on each side of the road and four acres per mile, or 4,000 acres, in every county. Adding to this another minimum of 50 miles of primary highway to every county, with eight acres of roadside per mile, means another 400 acres per county. In an average state, therefore, there are, as a very minimum, around 440,000 acres in roadsides. In the nation, there are reported to be two million acres of roadsides under municipal, county, or state control and another million in the offing in federal programs.

By E. P. Sylwester

Extension Botanist & Plant Pathologist
Iowa State College

In most states the highway commissions do a marvelous job of maintaining highways. Also, the various county boards of supervisors and county engineers are becoming much more interested in all phases of weed and brush control.

A good grass cover is the first line of defense against soil erosion in highway areas. Furthermore, elimination of weeds and brush reduces the effort in snow removal. Of interest to farmers is the elimination of insect and plant disease hosts that comes with the removal of weeds.

Briefly, highway weed control resolves itself into two general sections. They are: selective control on roadsides where it is desirable to kill un-wanted weeds and brush and maintain a grass cover; and the use of soil sterilants under guard rails and around bridge abutments, signal and signal posts, traffic islands, and county yards where it is desirable to eliminate all vegetative cover.

Selective weed and brush control along highways revolves around the use of the selective materials 2,4-D and 2,4,5-T and their chemical mixtures.

For controlling most roadside weeds, 2,4-D, preferably in the ester form, has given best results. Most spraying units use pressures of around 30 to 50 pounds and apply enough material to moisten the weeds. Boom sprayers are used on large areas of roadside, and individual hand booms on scattered brush or weeds. Good coverage is essential. Many counties do not spray close to farmsteads unless requested to do so. Anyone who has tomatoes, grapes, or other sensitive plants growing near roadsides usually is given the opportunity to post warning signs to attract the attention of the spraying crews. The use of well trained crews, low pressure, soft water, and caution is urged for roadside spraying. Danger from spray drift and spray fumes must be considered.

Sprays should be applied when weeds are growing—not after they are old and tough and have produced seed. Often in beginning pro-

(*Continued on Page* 99)

Mercedes Dusting Service

Prompt Service & Good Results

By Lloyd P. Nolen
General Manager
Mercedes Dusting Service

WITH the heaviest concentration of agricultural airplanes in the country, the Lower Rio Grande Valley in Texas has supported our company for 15 years and has seen its business grow by 25 per cent in the last five years alone. Some of the reasons for this will be discussed in this article but, briefly they are: we continue to improve our service and equipment; we have developed and modified equipment to perform more farm jobs than ever before; and more growers have accepted the airplane because of improved sales efforts and public relations by pesticide manufacturers and aircraft operators.

In 1945 we launched the Mercedes Dusting Service in the lower Rio Grande Valley at Mercedes because of the warm climate and year around crop season. The four-county farming area of the Lower Valley is approximately 70 miles wide and 25 miles deep.

At that time there were only about eight airplane companies serving this area; now there are 35. The original service was very poor, because there were not enough airplanes to do the job and those that were available were prewar ships with obsolete engines. Pilots were being asked to fly in weather unfavorable for optimum insect control and the poor results served to disenchant growers with airplane dusting. Growers were often forced to wait several days for an airplane to show up after turning in an order.

In view of this, we decided to build our business on prompt service and good results. We would not take on more customers than we could serve and we would not fly in weather that would not permit good results. This conservative policy eventually paid off, and has gained for us the confidence of the growers.

During those early years, we found many ways in which we could improve our service, equipment, and results. We found that flying technique was important to best results and our pilots have learned to fly each job individually.

We found that even though our early dust spreaders and hoppers did a passable job, there was room for improvement. Over a period of three years of experimental work we built spreaders that gave distribution of dust over a 40 feet wide swath. Our new "split-venturi" spreaders, combined with wing tip spill plates installed in 1950, gave us a flatter swath and more even coverage.

In 1948, when liquid insecticides were first being developed and recommended for farm use, we brought in, from Mississippi, the first airplane sprayer to be used by an established company in the Rio Grande Valley. The results were good. Before 1948 all of our work was dust, but by 1958 it was 85 per cent spray and only 15 per cent dust.

Some of the reasons for this shift are that better liquid materials are being developed and the total cost per acre to the grower for liquids is less than with dusts. Spray may be applied under more adverse wind and weather conditions than dust, and in our area, only the first two hours after daylight can be used for applying dust effectively. Spray may be applied all day. In addition, while a light rain shower is likely to wash dusts off the leaves, spray materials can withstand a light shower.

Recently we installed the Swathmaster sprayer on two of our airplanes. It will apply up to 100 gallons per acre and enable us to do several more farm jobs than we had been doing previously. We have done weed control with oil and chemicals, foliage fertilizing in vegetable crops, fungicide spraying, and heavy duty defoliation on extra rank cotton since adding the high-volume sprayer.

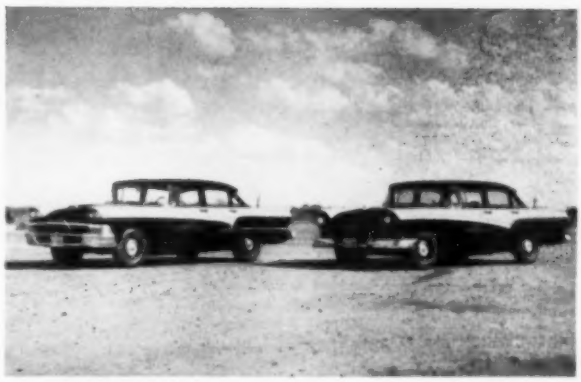
We originated the first field check service to be provided by an applicator company in the valley. We had found that unsatisfactory pest control could be traced to the wrong insecticide having been used for the insect concerned. Now, when an order comes in, we check to see what insect is doing the damage and that the proper insecticide

is used. This extra customer service has become one of the most important parts of our operation. Many of our growers turn a crop over to us as soon as it comes up. On these fields, we make regular inspections, make necessary chemical recommendations, apply the material and stand behind the results, assuring the grower of a clean crop at harvest.

On other jobs we make inspections and recommendations at the request of the grower. Our field men keep informed on the latest chemical developments and know which materials will do the best job under specific conditions. They know which will be the most economical to the grower and the proper time for the application.

Our Stearman airplanes originally had 220 H.P. engines, and were equipped with 800 pound capacity dust hoppers and 130 gallon spray tanks. In an effort to make each unit capable of doing more work in less time, we replaced these engines with 450 H.P. engines and installed a newly-designed "high-lift" upper wing. These changes enabled us to install 1,200 pound dust hoppers and 200 gallon spray tanks.

Our loading ramp at Central Valley Airport can accomodate five airplanes, two of which can be loaded simultaneously. Four mixing tanks have a total capacity of 1,350 gallons. Two separate pump-



Top: Two planes can be loaded simultaneously at the loading dock. The fittings on the side of the airplanes prevent spilling chemicals into the cockpit. Right: Two of the company's radio - equipped field cars.

Pilots Frank Baker, Roscoe Norman, and Ted Overeyender study aerial photographs of a field to check its location and hazards. The company maintains a compete set of aerial photos of its entire area. Each photo covers three square miles.

Mechanics are shown in the Mercedes Dusting Service's repair shop where they are installing new spray equipment in a Stearman. During the off-season, pilots double as mechanics and keep themselves employed and the equipment in order.

ing units each have their own well and can pump well water, fill any of the four mix tanks, rotate or agitate each tank load, transfer from one tank to another, fill the water storage tank, and load the airplanes. There is a 2,000 gallon tank for diesel oil.

A portable electric pump is used to transfer concentrate from the drum to a measuring tank. The concentrate is then transferred to the proper mix tank by valve and stationary electric pump.

The airplanes are loaded by "quick-connect" fittings in the side of the plane. This prevents any spilling of chemical into the pilot's seat or on top of the tank, eliminates foam in the tank, and does away with any climbing up on the wings of the plane with a heavy hose. In addition, it is safer and accelerates the loading operation.

Presently, we are operating with ten aircraft; eight stearmans and two Pipers. Four of these are sprayers, two are combination dust or spray, and four are straight dust. Some of our pilots dust in the early mornings and spray the rest of the day. During the busy season we have seven pilots to operate the ten ships. Also in the busy season we have two field men on crop inspection work, another man handling flagging crews, one man dispatching airplanes, a bookkeeper, and one mechanic on general maintenance in addition to loading crews and flag men. In slow season, two of the pilots run our overhaul shop. Our bookkeeper doubles in the maintenance shop and another pilot operates our charter airplane service. In this way we have overcome one of the major problems of our seasonal type of business by providing year round employment for most of our personnel.

We restrict our operation to a radius of 25 miles from our home base in Mercedes. In this area we have three auxiliary landing strips and two mobile spray loading rigs. This enables us to do more work per airplane per day.

We use three field cars equipped with mobile radio and a walkie-talkie unit. With time the most important element in busy seasons, the value of this radio equipment cannot be overemphasized. It doubles the utility of our field cars and greatly increases the work capacity of our airplanes and field crews.

We have a complete set of aerial photos of our entire area and, at the beginning of a season, many of our growers come by and mark their fields, numbering different blocks. With this done, our dispatcher can locate the field and brief the pilot when the grower calls in an order. This serves to eliminate many costly mistakes such as dusting the wrong field. We keep these maps current by marking all obstructions in each field in red pencil.

All of these features of our operation play a part in each job we are called upon to do. For example, a grower might call our

(*Continued on Page* 98)

Two New *Call Air*

Specialized

AGRICULTURAL AIRPLANES

MODEL A-5 150 H.P. MODEL A-6 180 H.P.

Designed Specifically to Meet the Needs of the Aerial Applicator

- BETTER SWATHS
- BETTER SPRAY PATTERNS
- LOWEST OPERATING COST
- RUGGED CONSTRUCTION
- EASY TO FLY
- EASY TO LOAD
- GREATER LOAD CARRYING ABILITY

It's the Farmer's Choice!

THE SAFEST AGRICULTURAL AIRPLANE EVER BUILT

Call Air

AFTON, WYOMING

It still takes these to use parathion safely

Since its introduction by American Cyanamid Company in 1948, parathion has become a standard insecticide. It was the *first* organic phosphate and far more powerful than any insecticide existing at that time. It was also the first wide-range insecticide because it controlled insects not killed by chlorinated insecticides.

Handling parathion safely. Respirator and protective clothing must be used when mixing, applying and cleaning up.

Parathion is—as it always has been—highly toxic to man and animals. For this reason American Cyanamid introduced it together with a strict safety program. Printed on the label

Malathion controls 105 destructive pests, yet can be handled safely without respirator and protective clothing.

of every package are the precautions necessary to use it safely. Of these, the one most often ignored is the use of a respirator and protective clothing when mixing, spraying or dusting. The final instruction is: "If you are unwilling or not equipped to observe these precautions, take this package back to your dealer for refund." Good advice 10 years ago . . . still good advice.

An alternative

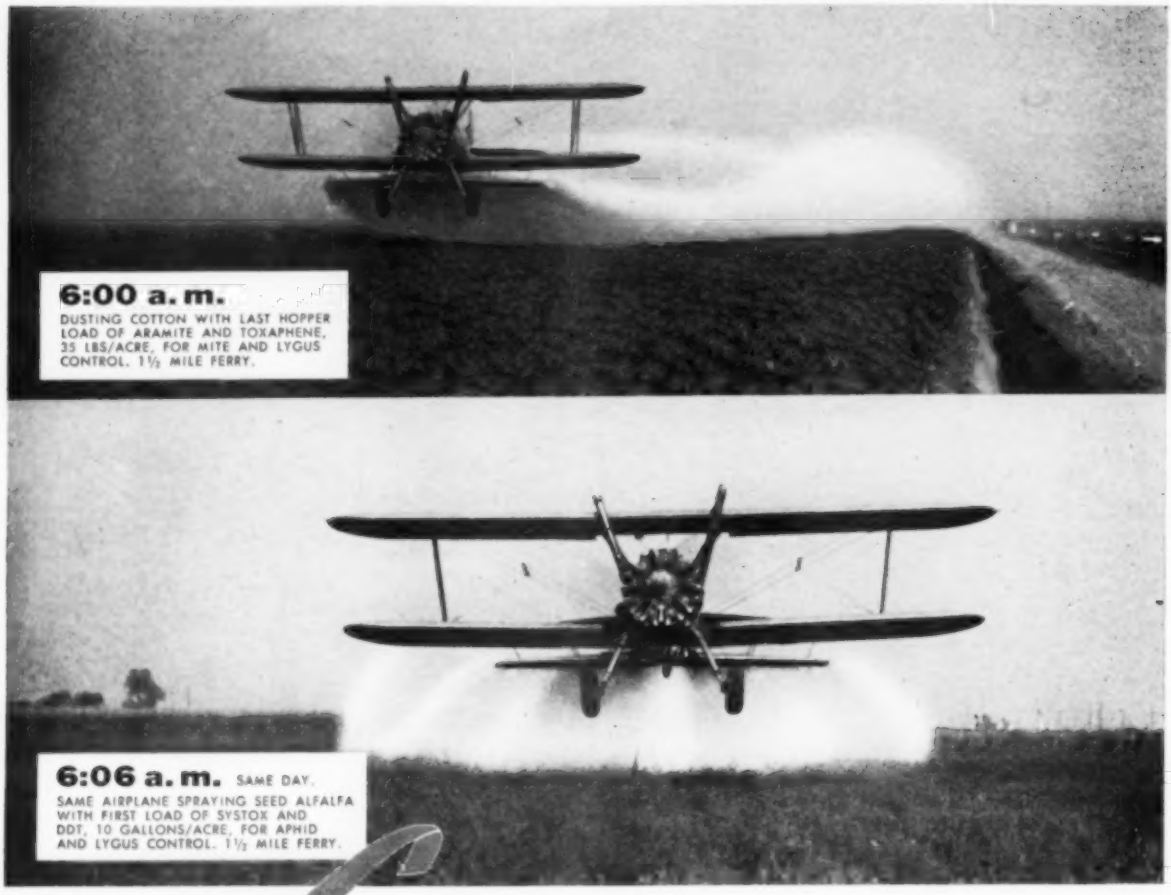
There *is* an alternative today for those growers unwilling or unable to comply with parathion's safety precautions: Malathion. This insecticide is also a phosphate and has parathion's insect-killing power. *However, unlike parathion, malathion has very low toxicity to man and animals.* So low in fact, that the USDA calls malathion, ". . . one of the safest insecticides to handle." And the U.S. Public Health Service says, ". . . the toxicities of malathion (oral and through the skin) are less than those of DDT."

American Cyanamid makes both parathion and malathion. Both insecticides are extremely useful . . . and both can be used safely. Malathion, however, is *easy* to use safely.

Send for free leaflets. American Cyanamid Company, Agricultural Division, Dept. AC-2, N. Y. 20, N. Y.

CYANAMID

PHOSPHATE INSECTICIDES


6:00 a.m.
DUSTING COTTON WITH LAST HOPPER LOAD OF ARAMITE AND TOXAPHENE, 35 LBS/ACRE, FOR MITE AND LYGUS CONTROL. 1½ MILE FERRY.
6:06 a.m. SAME DAY.
SAME AIRPLANE SPRAYING SEED ALFALFA WITH FIRST LOAD OF SYSTOX AND DDT, 10 GALLONS/ACRE, FOR APHID AND LYGUS CONTROL. 1½ MILE FERRY.

THE SELLERS Swathmaster MEANS

MORE AERIAL APPLICATING HOURS PER DAY

These photographs clearly illustrate how the remarkable all-purpose Swathmaster can give you *more aerial applicating hours on more different crops in a single day* than any other presently available dispensing device.

A simple resetting of the pilot control adjusts the Swathmaster's gate opening for any material, dry or liquid, seed or pellets, in a few seconds for the next job...giving you maximum flying hours during good applicating weather.

The stainless steel Swathmaster completely eliminates pumps, valves, nozzles, plumbing and spreaders and the ground time normally required to service them.

The Swathmaster dispenses dry or liquid materials without streaking and its downwash gives full penetration of material into rank foliage . . . dusts a full 50 ft. swath width; seed at 66 ft. and rice at 96 ft. (or half these widths for double coverage); or liquids from 1-180 gallons/acre.

Write, wire or phone today for the new eight page brochure. A 16 mm color and sound motion picture shows the Swathmaster in action...it is available for loan on your request.

U.S. PATENT 2,772,061 AND MEXICAN PATENT 55,933

MANUFACTURED AND DISTRIBUTED BY

TRANSLAND AIRCRAFT

2600 W. 247TH ST., TORRANCE, CALIFORNIA • PHONE: DAVENPORT 6-1681

ALSO DISTRIBUTED BY

SELLERS AVIATION INC., 1551 CRESTMONT DR., BAKERSFIELD, CALIF., PHONE: FAIRVIEW 2-5184

Schools Open For Agricultural Pilots

A field lesson at the South Dakota school covers the operation of the spray pump mounted on an Aeronca airplane.

THE development of agricultural pilots is becoming as essential to the future growth and success of the aerial application industry as is the development of new and specialized aircraft. Just as war surplus planes are being joined by aircraft designed specifically for aerial application, former Air Corps pilots are finding themselves joined by former commercial and amateur fliers.

Agricultural aviation, however, requires pilots who are well qualified to perform its highly intricate and specialized type of flying. This has led to the development of agricultural pilot training schools in many centers across the United States. Two of the first of such schools are the Agricultural Aviation Institute at Minden, Nevada, and the Midwest Agricultural Pilot Training Course offered by South Dakota State College, Brookings, S. D.

Held in the fall, the four-week, South Dakota course includes approximately 30 flight hours, part dual and part solo, in Piper and Aeronca aircraft. Classroom work takes up 60 hours and the curriculum includes: airplane care and service, ten hours; calibration of equipment and pattern measurements, ten hours; insect control and safe handling of chemicals, 20 hours; weed and brush control, ten hours; seeding and fertilizing, three hours; plant disease control, two hours; law and regulations, two hours; and customer relations, three hours.

Near the campus of S. D. State, 160 acres of close-cropped alfalfa have been fashioned into a practice field. At one end of the field, dangling 18 feet above the ground, a 60-foot length of wire is suspended between two wooden posts to simulate utility wires, one of the applicator's most persistent hazards.

Student pilots pass under and above the wire and make scores of dry runs, only inches above the soil, across the field. Starting at daylight, planes and pilots go through take-offs, climb-outs, applicator "S" turns, stalls, contour spray runs, set downs, and the rest of the more than 30 basic maneuvers that must become second nature. They practice landing on a runway only ten feet wide and also log hundreds of tricky, cross-wind landings.

Between twice-a-day shuttle trips from the classroom to the air field, the fliers absorb knowledge of insect control and the safe handling of chemicals. They study weed and brush control, defoliating and desiccating, and methods of seeding and fertilizing by air.

Instructors for the Brookings course come from five cooperating agencies—South Dakota State Aeronautics Commission, S. D. Aviation Trades Association, S. D. State Department of Agriculture, the F.A.A., and the state college. The original curriculum was designed by Gale F. Hanson of the F.A.A. and Fred E. Weick, past head of the personnel aircraft research center at Texas A. & M. Mr. Weick now is head of the Piper Aircraft Development Center. The course is conducted by Ralph W. Lindsay, air coordinator for South Dakota.

The Agricultural Aviation Institute, a division of the Turbo Dynamics Corp., provides a course that is adapted to the educational standards of the average commercial pilot. Its lessons include flight instruction and area planning, ground school (equipment operation and elements of agriculture), legal and customer relationships, and chemicals effects and handling. The course includes approximately 32 hours of flying, dual and solo, in Piper PA-18's, Stearmans and other available aircraft under varying conditions.

Normally, 30 to 45 days are devoted to flight training. This is co-

(Continued on Page 66)

A student agricultural pilot skims the practice field. The lightweight plastic spray tank on his plane holds enough liquid for ten field passes.

A superior new spreader-sticker from ALLIED CHEMICAL...

PLYAC*

Makes Sprays Stick Better

(even in rainy weather!)

Rain or shine, sprays stick better with Plyac—Allied Chemical's totally new liquid spreader-sticker made with A-C® polyethylene.

With Plyac, fungicides and insecticides work more effectively. They stick better and stay where they belong even in rainy weather when other sprays wash off easily.

Result? Plyac prolongs killing action . . . stretches spray effectiveness . . . reduces the amount of re-spraying necessary.

Plyac comes in convenient liquid form—easy to measure and easy to add. No mess. No fuss. May be combined with all wettable powders or emulsifiable insecticides, fungicides and weed killers. Plyac is a "*non-oil*" type product. Only 2 to 4 ounces are usually required for each hundred gallons of spray mixture.

Write today for further information about Plyac—the new and far superior spreader-sticker made with A-C polyethylene.

*Trademark of Allied Chemical Corporation

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N. Y.

PCO's Operations Widening

J. J. Davis, secretary-treasurer of the Indiana Pest Control Operators Association, said recently in a report on the activities of the association that the scope of the commercial pest control operator has been extending steadily in recent years to encompass a great variety of services to farms and rural areas.

Speaking in reference to a recent survey of members of the Indiana group, Dr. Davis said that many of them are servicing farmers for weed control as well as for rats, mice, and termites. Many operators treat lawns, Dr. Davis said, and some provide a consulting service to farmers.

The tremendous advance in pest control chemicals and applicating equipment has led to large scale operations that are too expensive and complex for the average farmer to handle without professional assistance, Dr. Davis pointed out.

Dr. Davis, who formerly was head of the department of entomology at Purdue University, listed three fields of service, each of which requires special training. He mentioned commercial pest control, arboriculture, and aerial application and said that, in his opinion, each should be licensed as a protection against inferior and itinerant operators who provide unsatisfactory service.

The future for pest control operators is bright, Dr. Davis predicted, as long as they remain efficient. He said that the future depends on the effective and successful use of equipment, facilities, and knowledge by the operator.

•

Pest Control Proceedings

The proceedings of the 12th annual convention of the Association of American Pesticide Control Officials, held Oct. 15 to 18, 1958, in Washington, D. C., are available at a price of $1 per copy.

They can be ordered directly from the AAPCO secretary-treasurer, A. B. Heagy, Box HH, Univ. Post Office, College Park, Md.

TRITHION® Now Registered for Use on 36 Crops

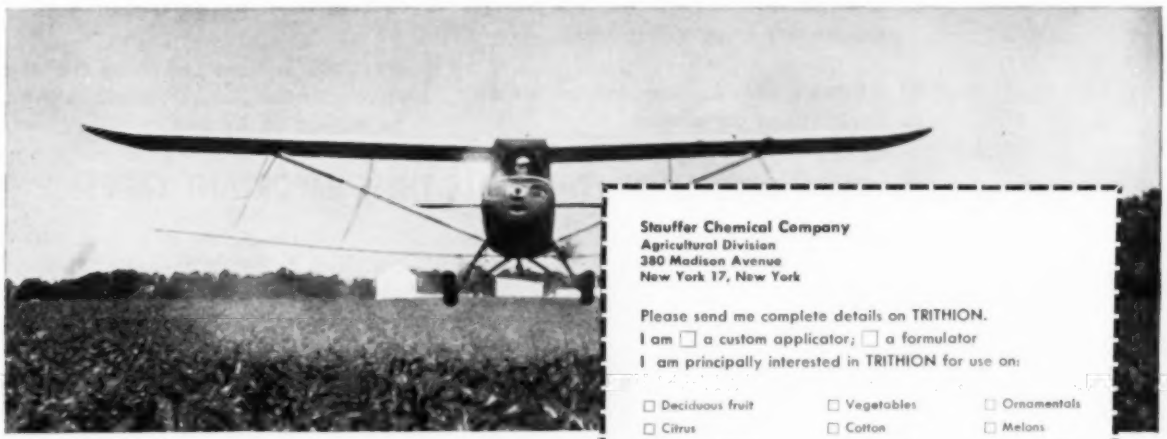
Extensive field use on many crops throughout the United States confirms the outstanding advantages of TRITHION, miticide-insecticide.

It has long residual action . . . is economical because fewer applications are required . . . is less hazardous to apply than many organic pesticides . . . is compatible with most other pesticides . . . and is especially effective against mites, aphids, scale insects, plus many other insects such as Mexican bean beetle, codling moth, various "hoppers," etc.

TRITHION 4 Flowable, a special water emulsion containing 4 pounds of TRITHION per gallon, combines the good spreading qualities and low plant injury of a wettable powder with the ease of handling, high degree of suspensibility and stability of a liquid concentrate. TRITHION 25% Wettable Powder is excellent for use where growers prefer this type of formulation.

Formulators and custom applicators can use TRITHION 25% Dust Base or 25% Wettable Powder for formulating their own dusts containing 2% or 3% TRITHION. These dusts are stable, highly effective, and can be formulated in combination with most other insecticides and fungicides.

Fill in and mail the coupon below for full information on TRITHION. Stauffer Chemical Company, 380 Madison Avenue, New York 17, New York. Sales and service offices throughout the country.



Stauffer CHEMICALS SINCE 1885

One of the world's largest specialists in farm chemicals.

®TRITHION is Stauffer Chemical Company's trade-mark (registered in principal countries) for *O,O-diethyl S-p-chlorophenyl thiomethyl phosphorodithioate*, an insecticide-miticide.

Stauffer Chemical Company
Agricultural Division
380 Madison Avenue
New York 17, New York

Please send me complete details on TRITHION.
I am ☐ a custom applicator; ☐ a formulator
I am principally interested in TRITHION for use on:

☐ Deciduous fruit	☐ Vegetables	☐ Ornamentals
☐ Citrus	☐ Cotton	☐ Melons
☐ Berries, Grapes	☐ Nut Crops	☐ Seed Crops

NAME.....
(Please print)

FIRM.....

ADDRESS.....

CITY.....ZONE.....STATE.....

agricultural

Use the original systemic insecticide that still outperforms all others!

Systox*

Nothing stops aphids, mites and leafhoppers like SYSTOX!

NO OTHER INSECTICIDE OFFERS ALL THESE ADVANTAGES!

1 **SYSTOX** works in the sap stream . . . protects entire plant or tree, even guards new growth as it forms.

2 **SYSTOX** lasts longer, requires fewer applications per season.

3 **SYSTOX** is harmless to beneficial insects after application.

4 **SYSTOX** is absorbed into the sap stream of the plant or tree . . . can't be washed off by rain.

NOW RECOMMENDED FOR ALL THESE IMPORTANT CROPS!

Apples	Strawberries	Hops	Lettuce	Delphinium
Pears	Stone fruits	Beans	Muskmelons	Holly
Sweet Cherries	Pineapple	Broccoli	Potatoes	Lillies
Grapefruit	Cotton	Brussels Sprouts	Seed Alfalfa	Linden
Lemons	Almonds	Cabbage	Alfalfa Hay	Pansies
Oranges	Pecans	Cauliflower	Clover Hay	Roses
Grapes	Walnuts		Azalea	Viburnum

Be sure you're stocked and ready for infestations
Order SYSTOX now from your Chemagro Distributor

A PRODUCT OF

CHEMAGRO

Kansas City, Missouri

"Chemicals for Agriculture—Exclusively!"

*Reg. U.S. Pat. Off. by Chemagro Corporation, manufacturer under license from Farbenfabriken Bayer, A.G.

Deliver First Ag-Cat

Alden E. Robinson (left) accepts delivery of first Ag-Cat from Terrell Kirk, Grumman sales representative.

The Grumman Aircraft Engineering Corp., Bethpage, New York, has announced the delivery of the first Grumman Ag-Cat to be sold on the domestic market. The plane was delivered to Alden E. Robinson of Mills Air Service, Accord, N. Y., on April 10 at the Schweizer Aircraft Co. plant in Elmira, N. Y. Schweizer is producing the plane for Grumman.

Mr. Robinson was one of three agricultural operators to fly and evaluate the prototype of the Ag-Cat for Grumman two years ago. He normally operates four aircraft for an eight month season, spraying orchards, row crops, blueberries, and mosquitoes, and fertilizing timber. He said that he expects the new Ag-Cat to "make as much money for me as two of my previous airplanes."

The new biplane demonstrated its capabilities April 14 at Grumman's Calverton, N. Y. airport. The demonstration featured an actual application of Uran 30 fertilizer to the Calverton airstrip and was conducted jointly by Grumman and the Nitrogen Division of the Allied Chemical Corp., New York, manufacturers of the fertilizer employed. Grumman is fertilizing the whole airport with the new plane.

According to C. E. Moore, sales manager of the Ag-Cat, 450 acres of grass were fertilized in four-and-one-half hours of spraying time during the first three days of the project. He said that this is the first time in the history of the field that they have been able to fertilize all of it in one season.

For the demonstration, the Ag-Cat applied 13 gallons of spray per acre with 35-foot swaths. The plane has a capacity of 217 gallons and can take off, apply its full load, and land again in six minutes.

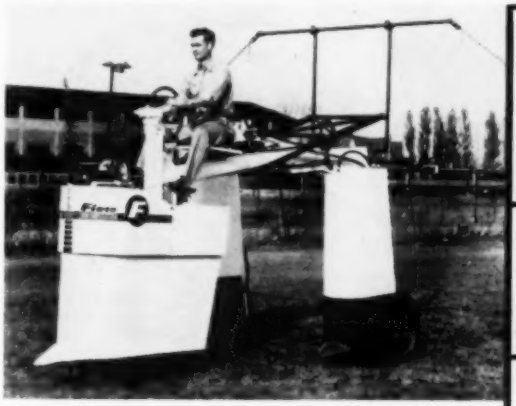
The Schweizer Corp. presently is producing eight Ag-Cats per month at Elmira.

Seek Aerial Application Ban

The League of Ohio Sportsmen has petitioned the Congress of the United States to terminate aerial applications of pesticides and herbicides by federal agencies, either by suspension of appropriations or specific legislation.

In response to this, the National Aviation Trades Association is asking its members to write their representatives in Congress to urge the continuance of aerial application in pest control programs.

DOUBLE YOUR PROFITS



with the Finco CROP PROTECTOR

One basic high-clearance, self-propelled Finco Crop Protector for:

- Spraying
- Crop Topping
- Granular DDT
- Liquid Fertilizer
- Defoliating
- Dusting
- Controlling insects, blight and weeds

DISTRIBUTORSHIPS AND DEALERSHIPS OPEN. WRITE TODAY FOR FULL DETAILS.

Finco, inc.
AURORA 37, ILLINOIS

THE LINE RIDER AND HIS GANG of Diamond Chemical killers are the most inexpensive hirelings you can find for rubbing out weeds and brush. Back in Ohio they saved their bosses $18.75 per highway mile per season.

Meet the gang:

FOR MIXED BRUSH—LINE RIDER LV-3D/3T, a 2-Ethyl Hexyl Ester formulation of 2,4-D and 2,4,5-T containing 3 pounds each of acid equivalent per gallon.

FOR MAPLES AND OAKS—LINE RIDER LV-6T, a 2-Ethyl Hexyl Ester formulation of 2,4,5-T containing 6 pounds of acid equivalent per gallon.

FOR AREAS ADJACENT TO SENSITIVE CROPS—LINE RIDER AMINE 22, alkyl amine salt formulation of 2,4-D and 2,4,5-T containing 2 pounds each of acid equivalent per gallon. Applied as a water-borne spray.

FOR SPECIAL CONDITIONS—Also available are other standard LINE RIDER formulations, including Butyl and Low Volatile Esters of 2,4-D and 2,4,5-T containing 4 pounds acid equivalent per gallon.

If you want deadly marksmanship, send for new LINE RIDER brochure giving details. Write Diamond Alkali Company, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

PEST ROUNDUP

By Kelvin Dorward

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head — Survey & Detection Operations, Plant Pest Control Division, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

1959 Insect Infestations in West and Southwest Areas Threatening

Khapra Beetle Found in Texas and Adjacent Areas of New Mexico and Mexico

THE serious stored grain pest, khapra beetle, which was first found in this country in California in 1953, recently appeared in a feed mill at El Paso, Texas. Following this find, infestations were discovered in the adjacent areas of New Mexico and Juarez, Mexico. As of April 1, 16 infestations had been found in El Paso, 10 in the El Paso trade area of New Mexico, and two in adjacent Juarez, Mexico. Until these recent findings, all previously known infestations in New Mexico had been eradicated, and very few known infested properties remained to be fumigated in Arizona and California. Arrangements have been completed for the handling of all known infestations in Mexico. With respect to the current infestation in the El Paso area, arrangements have been made to fumigate the properties in both Texas and New Mexico, and discussions are underway with respect to the Juarez Mexico infestations.

Cotton Boll Weevil Spring Survival Survey

THE cooperative survey consisting of collection and examination of surface woods trash, to determine the number of boll weevils surviving the winter, was completed by the end of March in five states. Collections were made in the Louisiana Parishes of East Carroll, Madison, and Tensas. The average number of live weevils per acre found was 2,246 compared with 1,480 in the spring of 1958. During the 23 years that entomologists at the Tallulah, Louisiana Research Station have maintained these records on Madison Parish, the number of weevils per acre (3,026) found this spring has been exceeded only one time. In 1956, 3,654 live weevils per acre were found.

Boll weevil survival count average in Mississippi was slightly higher this year than last year, being 464 compared with 392 in the spring of 1958. The per cent survival of the number of weevils entering hibernation last fall, was 12. In 1958 there was a 6.6 per cent survival.

Average spring survival boll weevils counts in Georgia were less than half those reported a year ago. Average counts for the four regions sampled were 329 live weevils per acre of surface woods trash this year, compared with 731 in 1958. The per cent survival this year was 29, which is the second lowest in the 8 years that records have been maintained.

Survival counts in the Carolinas and Virginia varied considerably. In the south central area of South Carolina and Coastal Plains of North and South Carolina counts were well above 1958. This spring, the respective counts for these areas were 699 and 1963, compared with 457 and 403 last year. In the Piedmont area of North and South Carolina, the north central area of North Carolina and Vir-

Boll Weevil Survival — Spring 1959

State	Areas or District	Average No. Weevils Per Acre 1959	1958
North and South Carolina and Virginia	South Central South Carolina	699	457
	Coastal Plains—North and South Carolina	1,963	403
	Piedmont—North and South Carolina	242	296
	North Central North Carolina	81	54
	Southeastern Virginia	27	54
Georgia	Northwest	0	97
	North Central	726	1,307
	East Central	48	968
	South	145	532
Mississippi	Lower Delta	781	418
	Central Delta	364	551
	North Delta	284	381
	Hill Section	429	219
Louisiana	Northeast	2,246	1,480

ginia counts were similar to those of 1958. The table on page 65 briefly summarizes the counts of surviving cotton boll weevils found this spring.

Potato Psyllid Survey

DURING early March, potato psyllid surveys were conducted on overwintering hosts in the southwestern part of the United States. The potato psyllid causes the psyllid yellows of potatoes and tomatoes. In all areas surveyed, except the Howard County and Terrell - Pecos - Brewster areas of Texas, counts were much higher than in 1958. the wild host surveyed, lycium, was abundant and well advanced in Arizona and California, but mostly dormant in the Las Cruces, New Mexico, area. In Texas, with the exception of the El Paso area, plants were generally dormant and droughty conditions prevailed. The survey indicates a potentially severe outbreak for the 1959 season, providing weather conditions are favorable for development. The table below gives comparison of numbers of potato psyllids collected in the various areas.

General Insect Conditions

THE greenbug, by the latter part of March, was building up to rather high populations in various grain-growing areas. In Tillman County, Oklahoma, by the middle of the month, approximately 20,000 acres of grain had been treated for the insect. Barley, rye, and wheat were all reported as receiving some damage in various areas of Oklahoma. Although natural enemies were not numerous, it was expected that the potential damage would be reduced greatly if better growing conditions developed.

Spotted damage from the greenbug was apparent in Hansford County, Texas. The insect was found in nearly all of the panhandle and rolling plains countries surveyed. Heavy populations were also present in several central and north central Texas counties.

Although infestations have been found in New Mexico, Arkansas, and Louisiana, populations of the greenbug were generally light in these states.

The spotted alfalfa aphid, during March, caused local damage in parts of Texas, New Mexico, and Nevada. Populations were reported as light in Arizona, Kansas, and Oklahoma. There was a definite increase in populations in the latter state by the end of the month.

The alfalfa weevil was very active by the latter part of March, being numerous in Delaware, Maryland, and Virginia, and damaging in South Carolina and Georgia. Controls were necessary for the insect in Nevada and Utah.

Several important fruit insects were also active by late March. The first plum curculios were appearing from hibernation in Georgia. One commercial orchard had a count of 5 adults per tree, which is considered a very heavy population. Tent caterpillars were causing east Texas fruit growers concern, and egg masses of these insects were numerous in the Ogden, Utah, area. The apple grain aphid was hatching in Delaware, as was the apple aphid. The apple aphid was also hatching in the state of Washington by late March, and the insect was readily found in all Vincennes, Indiana, orchards examined March 30.

The green peach aphid was heavy on early lettuce in Yolo County, California, but by late March a fungus had reduced populations to a low level. This insect was increasing on lettuce and potatoes in Maricopa County, Arizona, and was found to be light on tobacco in 4 Georgia counties.★★

Potato Psyllid Survey on Overwintering Host

State	District	Average No. Per 100 Surveys 1959	1958	1957
Texas	Howard County	24	227	516
	Terrell-Pecos-Brewester	130	181	129
	El Paso	42	6	158
New Mexico	Las Cruces	54	7	158
Arizona	Phoenix-Tucson	992	93	95
California	Blythe-Barstow	237	96	143

AG. PILOT SCHOOLS

(*From Page* 59)

ordinated with classroom work and other activities that provide approximately 120 hours of classroom and homework.

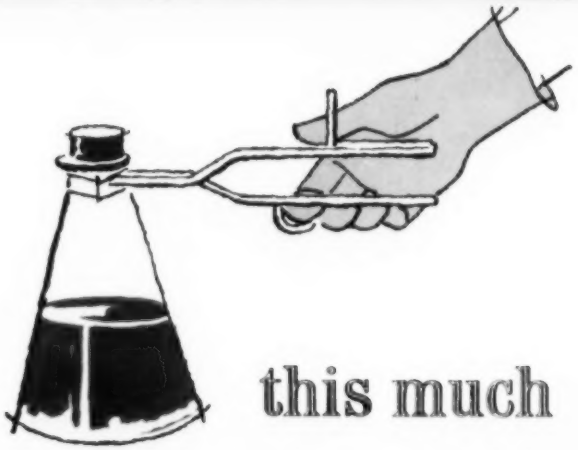
To meet the entrance requirements, pilots should have a commercial license and a minimum of 500 hours of solo pilot time. This minimum time may be waived if the applicant has had some actual experience as an applicator.

For those who do not desire flight training, a non-flight course is available that includes all the ground subjects. The complete ground school course also is available as a correspondence type course that can be completed by mail. This is ideally suited for experienced applicator pilots who lack the necessary ground subjects to apply for a state agricultural license.

The courses are conducted on a continuous basis at the Douglas-Tahoe Airport in Minden. Approximately 1,000 acres are set aside for the school's exclusive use and portions of this are marked off and adjusted for simulated swath runs.

The school is directed by Murray A. Kahn, director of the Turbo Dynamics Corp.'s nation-wide aviation operation, and Martin Kronberg, chief of the firm's flight operations. Mr. Kronberg is one of the early California pioneers in crop spraying and dusting.

Both of these agricultural aviation schools provide a placement service for graduates.★★



this much Methyl Parathion...

A little Victor methyl parathion puts the *cide* into those pesticides that knock boll weevils and other cotton pickin' pests for a loop.

Cotton farmers and pesticide formulators both bank on the fatal charm of Victor methyl parathion – whether used as a dust, a wettable powder, or an emulsifiable concentrate.

Perhaps you'd like to unload some of your problems . . . make your product more marketable, more economical to produce. You're in the driver's seat, of course, but selecting Victor phosphates, formates, and oxalates can pay dividends—as they have for many others in more than 40 industries. Write on your letterhead for literature of the chemical you are interested in. We'll have data on your desk before you can say, "It *pays* to see Victor."

Victor Chemical Works, Box 572, Chicago 90.

VICTOR
Dependable Name in
Chemicals
for 61 Years

this much 10-52-17

Dissolve one ounce of Victor Take-Hold[®] in a gallon of water and you have the perfect transplanting solution for seedlings and setouts.

High-analysis (10-52-17), Take-Hold plant food speeds formation of early root structure . . . helps seedlings overcome "setback shock" at transplanting time . . . resulting in earlier development. Nurserymen and commercial growers like to be in this preferred position of commanding "early bird" prices.

Producers of commercial fertilizers are in a preferred position, too, when they specify Victor P.F.S. (phosphatic fertilizer solution), for Victor—a leading producer of P.F.S.—offers fast and frequent tank car and tank truck delivery from five production points, strategically located from coast to coast.

For a fast start to a solution of *your* problem—either plant food or phosphatic fertilizer solution—contact Victor's technical service department. Or write on your company letterhead for a copy of our new bulletin "Handling and Storage of Phosphoric Acid." It's an easy way to learn why *it pays to see Victor.* Victor Chemical Works, Box 572, Chicago 90.

LISTENING POST

By Paul Miller

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Mycology and Plant Disease Reporting Section, Plant Protection Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Residual Activity of Fungicides Applied to the Soil for Bunt Control

LAURENCE H. Purdy*, reporting cooperative investigations of the United States Department of Agriculture Agricultural Research Service, and the Idaho, Oregon and Washington Agricultural Experiment Stations, writes that the major difficulty in controlling dwarf bunt (caused by *Tilletia contraversa*) of winter wheat in Washington is the perennial contamination of the soil with spores of the fungus. Crop rotation is not successful because the spores remain viable in the soil until wheat is planted again. Resistant varieties of wheat possess only limited usefulness, because many of the adapted varieties are susceptible to one or more races of the variable pathogen. Since neither rotation nor resistance has given good results, the development of effective chemical control measures has become increasingly important.

In previous experiments Dr. Purdy had obtained excellent control with applications of 10 pounds per acre of 40 per cent hexachlorobenzene (HCB), however, the cost of this treatment might limit its general adoption. If a fungicide retained its effectiveness through one or more additional seasons after a single application, however, the cost would be substantially reduced. The experiments reported herein were planned to determine how long the chemicals tested remained fungicidally active when applied at different rates.

MATERIALS AND METHODS:

Dr. Purdy tested Anticarie (40 per cent hexachlorobenzene), Terraclor (40 per cent pentachloronitrobenzene), and Panogen 15 (2.2 per cent cyano [methylmercury] guanidine). Rates of application were: for Anticarie and Terrachlor, 2½, 5, and 20 pounds per acre in a water suspension; for Panogen 15, water dilutions of 1:10,000, 1:1,000, and 1:10. Each plot received 300 milliliters of the respective water suspension or dilution. At each treatment date, the plots were randomized and replicated three times.

The plots, 99 in all, were defined as wooden frames on the surface of the ground. The frames measured 24 x 36 x 6 inches and were filled to a depth of 4 inches with field soil, a Palouse silt loam.

To determine the effectiveness of the treatments, the soil in each plot was inoculated before planting with a suspension of spores, applied at the rate of ½ gram of spores per square foot of soil surface. The closely related common bunt (*Tilletia caries*) was used for this purpose, since it is difficult to obtain high percentages of infection from artificial inoculation of soil with dwarf bunt spores.

Before the seed was planted fungicides and spores were worked into the soil of each plot to a depth of 2 inches.

Orin winter wheat was used for all tests except one, in which Red Bobs spring wheat was used. All seed was free from bunt spores.

Each plot was treated only once, before the first planting. One series was inoculated and planted three times, another series twice, and another only once. The dates of inoculation, treatment, and sowing were as follows: The first series (plots no. 1-33) were first inoculated April 24, 1956, treated and sown May 3, 1956; inoculated again November 2 and sown November 5, 1956; inoculated for the third time November 6 and sown November 8, 1957. The second series (plots no. 34-66) were inoculated November 2 and treated and planted November 5, 1956; reinoculated November 6 and planted November 8, 1957. The third series (plots no. 67-99) were inoculated November 6, treated and planted November 8, 1957.

Effectiveness of the various treatments was measured by the percentage of bunt appearing in each plot, based on the total number of heads per plot.

RESULTS AND CONCLUSIONS:

In the first series (treated once, inoculated and planted three times) Anticarie and Terraclor both gave good control at all three rates of application in the first planting (spring of 1956). Panogen 15 at the 1:10 dilution rate was also effective, but it was phytotoxic, and stands in plots where it was used were reduced slightly. Only fair control or none was obtained

(*Continued on Page* 104)

*Laurence H. Purdy, "Residual activity of of three fungicides applied to the soil for bunt control," *Plant Disease Reporter*, vol. 43, no. 1, pages 9-11, Jan. 15, 1959.

Sell or use these outstanding

GEIGY AGRICULTURAL CHEMICALS

INSECTICIDES

DIAZINON® INSECTICIDE

Effective, relatively safe, long residual phosphate insecticide. Controls a wide variety of insects, including "hard-to-control" varieties, on many fruit and vegetable crops. May be applied relatively close to harvest. Used for residual fly control in food processing plants and in dairy barns. Preferred by PCO's for control of roaches and household insects. May be formulated in over-the-counter household insecticides.

GEIGY METHOXYCHLOR INSECTICIDE

Multi-purpose insecticide. Low toxicity to humans and animals. Long residual action against many species of insects attacking fruits, vegetables and forage crops. May be applied to many crops up to 7 days before harvest period. Residual sprays applied to empty grain bins are effective in controlling many insects of stored grain. Direct application as a spray may be used on livestock other than dairy cattle for effective control of horn flies, cattle lice and ticks. On dairy animals direct application of Geigy Methoxychlor "50" as a dust may effectively be used for the same purpose.

MITICIDE

CHLOROBENZILATE® MITICIDE

Safe, effective, economical miticide. Non-irritating to skin. Controls many species of mites, including phosphate-resistant strains on apples, pears, citrus, almonds, walnuts and other agricultural crops. Controls mites on azaleas, holly, spruce and other ornamentals and nursery stock, including clover mites in shrubbery and lawns around dwellings. Long residual action. Compatible with commonly used insecticides, fungicides. Will not harm bees under normal field conditions.

for agriculture and industry

HERBICIDES

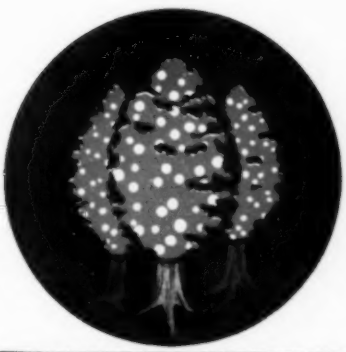
SIMAZINE™ HERBICIDE

Pre-emergence triazine herbicide for use on corn. One application at planting time provides full season control of most annual broadleaf weeds and grasses. Also recommended as a pre-emergence herbicide for use with nursery stock. Relatively low toxicity to humans and animals. Non-corrosive to sprayer equipment. No drift hazard. Used as a non-selective pre-emergence herbicide at higher dosage rates, SIMAZINE may be applied late Fall or early Spring for year-long industrial weed control. Minimum of lateral leaching. Non-flammable. Available as wettable powder or granules.

ATRAZINE™ HERBICIDE

New triazine herbicide for either pre- or post-emergence application. One application provides full season control. Used during late Spring and early Summer. Controls annual broadleaf weeds and grasses and many perennial weeds in walks, driveways, roadways, parking lots, railroad sidings and around industrial sites and other non-cropped areas. Relatively non-toxic to humans and animals. Non-corrosive to sprayer equipment. Non-flammable.

METAL CHELATES



SEQUESTRENE® METAL CHELATES

For correction of minor element deficiency in ornamentals, fruit trees, vegetables, turf.

For correction of iron deficiency:

SEQUESTRENE 330 Fe IRON CHELATE—for use in alkaline or acid soils.
SEQUESTRENE 138 Fe IRON CHELATE—for use in calcareous, other highly alkaline soils.
SEQUESTRENE NaFe IRON CHELATE—for use in acid soils.

For correction of manganese deficiency: **SEQUESTRENE Na_2Mn MANGANESE CHELATE**

For correction of zinc deficiency: **SEQUESTRENE Na_2Zn ZINC CHELATE**

ORIGINATORS OF DDT INSECTICIDES Geigy

GEIGY AGRICULTURAL CHEMICALS • *Division of Geigy Chemical Corporation* • Saw Mill River Road, Ardsley, N. Y.

Acme Protection Information

The Acme Protection Equipment Co., South Haven, Mich., has prepared a four page bulletin of useful information for users of insecticides and fumigants.

The bulletin, number 591, presents information on the history, use, hazards, and protection for users of modern insecticides and describes available mask equipment.

•

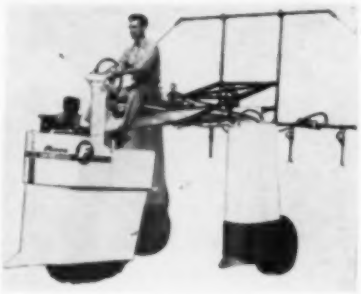
Plyac Spreader-Sticker

A new liquid spreader-sticker made with polyethylene has been introduced by the General Chemical Division of Allied Chemical Corp., New York. Marketed under the trade name, "Plyac", the product is said to give agricultural pesticide sprays spreading and sticking properties never before possible with conventional spreader-stickers.

Used with insecticides, fungicides, herbicides, and other agricultural and pest control sprays, Plyac improves initial and residual effectiveness and can reduce dosages or number of applications otherwise necessary, according to the company. Another advantage cited by General Chemical is that Plyac is non-oily and mixes well with commonly used spray materials.

•

New Finco Crop Protector



Finco, Inc., Aurora, Ill., has redesigned its Finco Crop Protector to permit adaptation to all types of agricultural applications. The one basic unit now can be used for crop topping, spraying, applying granular DDT, spreading liquid fertilizer, dusting, seeding, and controlling insects, blight, and weeds.

Among features of the machine cited by the manufacturer are; a multiple power package, an advanced spraying system, and twin tanks for extra stability and safety.

International Conference

An international Agricultural Aviation Conference is scheduled to be held Sept. 14 to 18 at the College of Aeronautics, Cranfield, Bedfordshire, England. Progress reports and papers for discussion will be submitted by European scientific or technical workers and operators, and will cover the following aspects:

Developments in agricultural aviation; agricultural chemicals and fertilizers, including biological efficiency; and aircraft, equipment, and corrosion problems.

On the last day of the meeting, a demonstration will be held of aircraft designed or adapted for agricultural work. The National Association of Agricultural Contractors (England) is organizing the demonstration which will provide an opportunity for aircraft from many different countries to be compared. The demonstration will be supported by an exhibition of appliances, materials, and services relevant to agricultural aviation.

the exclusive
FLEX-A-FOAM
DUST MASK
(no other product like it . . . anywhere)

Here's everything that management and worker alike could possibly want in a dust respirator!

1. Form-fitting design: Self-adjusting to any size and shape of face without pressure or irritating discomfort.
2. Attractive styling: Smartly designed to suit the most discriminating wearer.
3. Filtering efficiency: Filters non-toxic dusts 100 times smaller than the eye can see.
4. Easy-breathing comfort: Easier to breathe through and talk through than an ordinary pocket handkerchief.
5. Feather-like weight: Weighs only 1 ounce complete.
6. Simplicity and economy: Only 4 tough, long-wearing inter-locking parts — all washable. Pure latex filter outwears throw-away type more than 100 to 1.

No wonder FLEX-A-FOAM is the one dust respirator workers welcome and WEAR!

Sample only $1.45 postpaid (Industrial price only)

FLEX-A-FOAM® DUST MASK

FLEXO Products, Inc. Westlake, Ohio

SPRAYING SYSTEMS
SPRAY NOZZLES
and related equipment

for better, lower cost farm spraying

BoomJet® SPRAY NOZZLES

For the broadcast spraying of grains and grasses . . . and distribution of nitrogen solutions and related liquid fertilizers.

TeeJet® SPRAY NOZZLES

Precision built for uniform spray distribution and exact volume control. Over 400 interchangeable orifice tips for all spray patterns and chemicals.

RELATED EQUIPMENT FOR BOOM AND HAND SPRAYERS

Split-Eyelet Connectors — TeeValve

Pressure Relief Valves — GunJet Spray Guns

For complete information . . . write for Catalog 30

SPRAYING SYSTEMS CO.

323 Randolph St., Bellwood, Illinois

INTERNATIONAL'S
FULL ORBIT
SERVICE

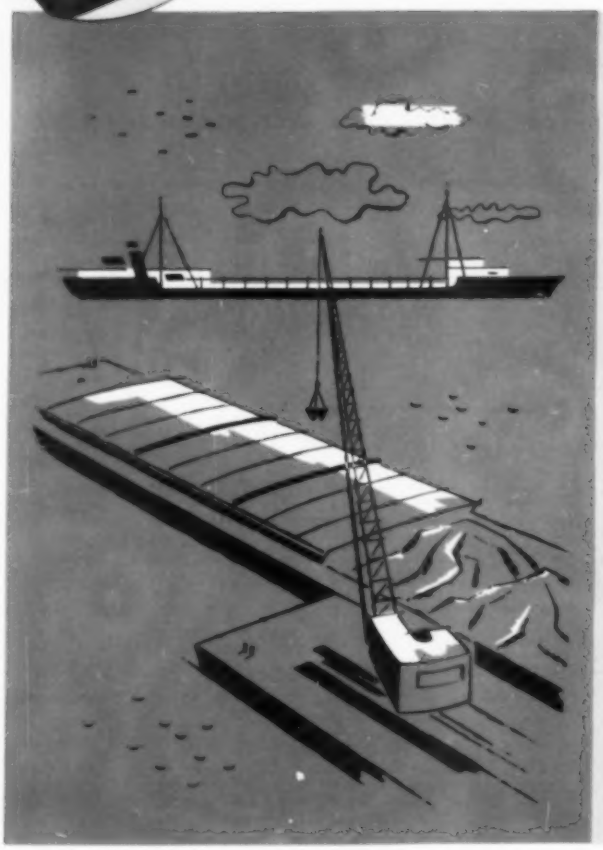
Setting New Standards of Quality Control

How IMC's
Triple Super Contract
gives you

TRIPLE VALUE SERVICE

and extra dollars in your pocket

International services triple the value of



IMC transportation service masters the maze of shipping problems for you

Let's face it: delivery can give you skull-busting headaches . . . unless you're protected by International Minerals' General Transportation Service. IMC helps you choose lowest cost methods — ship, barge, rail. IMC offers other advantages, like on-site storage at key transportation centers and rolling warehouse shipments. We can help you with rate negotiations, routing or interpretations of shipping regulations. In short, International Minerals takes the trouble out of triple super shipping.

Triple super trouble shooters - - complete and personalized technical service at your plant

Technical trouble-shooting in the fertilizer business takes experience and personnel. And International Minerals has both — a staff of technicians that stands ready when you need them . . . to help cut your in-plant production problems down to size. Let us help you in formulation . . . choosing equipment . . . designing plant layouts . . . streamlining materials handling . . . or in applying research information. Call on IMC for complete trouble-shooting service that works for you *at no cost to you!*

INTERNATIONAL'S FULL ORBIT SERVICE

your phosphorus contract...

FULL ORBIT SERVICE . . . IDEAS AND PLANS TO BUILD VOLUME, PRODUCE MORE PROFIT OVER COSTS!

International Minerals' Full Orbit Service is helping fertilizer manufacturers chart new profit strategy.

It's an exciting and *proved* program that sets new standards of service in the industry. First benefit is IMC's extremely high quality triple superphosphate. Then comes Full Orbit technical help in ironing out your in-plant problems . . . plus help in a host of ways to eliminate your transportation troubles.

Full Orbit Service makes the most of buyer-supplier teamwork to help you solve marketing problems . . . get the most from your sales manpower . . . make sales meetings pay off . . . and get real results from your promotion dollars through professionally planned use of newspapers, radio and TV.

The best part is, International's Full Orbit Service doesn't cost you a cent. Contact your International representative now. There's no obligation. Find out — as many other fertilizer manufacturers have — how IMC's Triple Superphosphate and Full Orbit Service can help you realize extra profits while you benefit from a smoother working operation.

From mine to manufacturer, International's quality count-down adds up to superior product control

Nobody guards triple super quality as carefully as International Minerals. Over 40 separate tests are used! More than 400 chemical analyses are made daily. IMC absolutely controls triple quality with a count-down that follows the product from raw material to shipment of the finished product. And as a final quality check, every shipment of International Triple Superphosphate has its own certificate of analysis — mailed to you before material arrives at your plant. Depend on IMC for quality.

MINERALS International CHEMICALS

Producers of Living Minerals

COARSE — International's coarse-textured Triple gives you the same excellent ammoniation batch after batch . . . promotes desirable agglomeration.

GRANULAR—International's granular Triple is non-crumbling, free-flowing, easy to apply—makes this product ideal for direct application.

RUN-OF-PILE—International's even-textured Triple provides uniform particle size, even density and high porosity that lets you ammoniate at higher rates, temperatures.

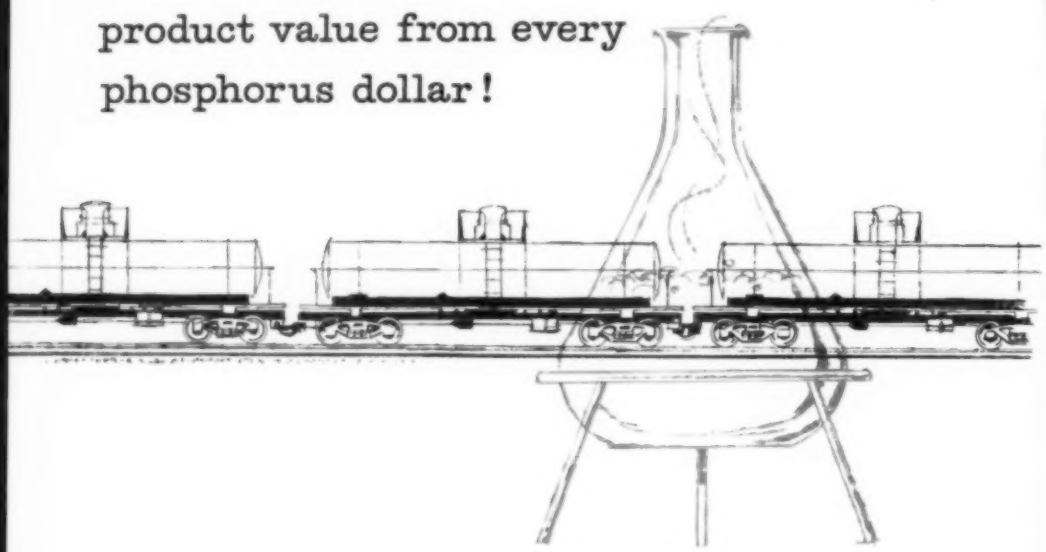
TRIPLE SUPERPHOSPHATE

Available P_2O_5 (min. guarantee) — 46.0%

Particle size:

	R.O.P.	GRANULAR	COARSE
+6 mesh	98-100%	97% min.	97% min.
−65 mesh	22-34%	0.5% max.	4% max.

An International contract helps you get full product value from every phosphorus dollar!



IMC TRIPLE SUPERPHOSPHATES AND PHOSPHATIC FERTILIZER SOLUTION SOLVE FORMULATION PROBLEMS

Now you can make International your dependable single source of all high-analysis phosphate ingredients. Benefit from International's three grades of top-quality triple superphosphate plus high purity 53%-55% phosphatic fertilizer solution. Get all the quality advantages International's processing adds to your product. Be sure with International.

Producers of Living Minerals

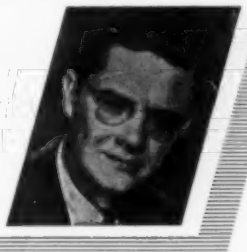
MINERALS International CHEMICALS

SPECIAL PRODUCTS DEPT., PHOSPHATE DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center: Skokie, Illinois

WASHINGTON REPORT



By Donald Lerch

WHAT is going on behind the scenes among wildlife conservationists? A quick look discloses a story that is becoming all too familiar here in the nation's capitol.

Call it "mobilizing public opinion" or what you will. It boils down to an attempt to influence Congress and the operation of government agencies by means of publicity.

Two measures of interest to both wildlife conservationists and the pesticide industry are now before Congress. One is the 1959-60 appropriation bills. Conservationists are out to kill Congressional appropriations for the USDA's imported fire ant eradication program.

The other is an amendment to the Pesticide Research Act introduced by Rep. Lee Metcalf (Mont.) and Sen. Warren Magnuson (Wash.). The Magnuson-Metcalf bills would increase Federal spending on pesticides-and-wildlife research from $280,000, approved in 1958, to a whopping $2,565,000 a year.

A lot of public pressure is needed to gain either objective, and some conservationists are trying to supply it via press releases and letters to the editors of newspapers in Washington and elsewhere.

This has become a standard kind of activity in Washington. Nearly everyone does it. It is one means of presenting your side of a public issue to Congress via the public media. Since you don't have to go near the halls of Congress, it is not considered lobbying. The technique, of course, gives considerable advantage to the side that makes aggresive use of it.

Even under ideal conditions, the chemical industry is at a disadvantage in a public contest of this kind. As one conservationist confided to us privately, all conservatonists have to do is to present charges and raise questions to make the headlines. The Industry has to refute the charges and answer the questions with facts.

You can always expect surprise twists in campaigns of this kind, and conservationists have supplied one. Some wildlife conservationists recently demanded via the public media that the USDA's new film, "Fire Ant On Trial," be withdrawn from circulation or be so changed as to include all the conservationists' objections to the fire ant eradication program.

Some observers here now suggest that the conservationists include all the sound arguments favoring the fire ant eradication program in their many press releases and statements opposing it. This action by those leading the battle to kill appropriations for the program would inject a welcome breath of objectivity into the issue.

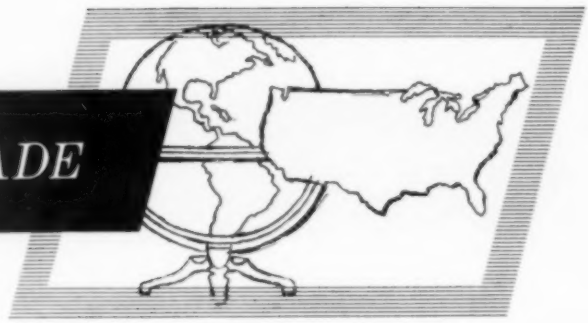
* * * * *

Don't expect any rapid Congressional action on the Magnuson-Metcalf Bill to boost appropriations for pesticide-and-wildlife research to $2,565,000 a year. The bill, now under consideration by the House Sub-committee on Fisheries and Wildlife Conservation, headed by Rep. Frank Boykin (Ala.) has a lot of hurdles to jump before it reaches the House floor. These include comments by USDA and U. S. Fish and Wildlife Service, public hearings,—and the feeling that few significant measures will be passed by Congress until 1960.

The bill, however, is not to be taken lightly. If passed, it would facilitate a 14-point program for wildlife research by the Bureau of Sport Fisheries and Wildlife. Areas of research would include: effect of fire ant control formulations on animal life, $175,000; effect of rodenticides on important mammals and songbirds, $75,000; effect of chemicals used in the Dutch Elm disease control, $80,000; studies of forest insect control programs, $125,000; effect of orchard spraying on animal life, $25,000; effect of chemicals used in mosquito control on fish and wildlife, $75,000; effect on wildlife of crop and forage treatment with chemicals (other than grasshopper control), $50,000; effect of herbicides on the habitat of birds and mammals, $70,000; the relationships of fungicide, nematocide and miticide treatments to wildlife, $50,000; pesticides and migrational movements of birds, $150,000; pesticidal contamination of water areas, $25,000; effect of chemicals on food chain organisms and their storage by invertebrates, $75,000; penned animal experiments, $100,000; and relationship between the sterility in the bald eagle and pesticides, $50,000. Also included would be: research on toxicity and tolerance levels for chemicals now in use, $85,000; field tests of chemicals now in use, $150,000; effect of present insect and pest control programs on fishery re-

(*Continued on Page* 97)

NEWS about the TRADE



Elected President of CSC

Maynard C. Wheeler has been elected president of the Commercial Solvents Corp., New York. At the same time, William S. Leonhardt was named financial vice president and treasurer, and Jeremiah Milbank Jr. was elected chairman of the board's executive committee. (Further details on page 95.)

Mr. Wheeler succeeds J. Albert Woods, who is continuing his association with the company as a consultant. Mr. Wheeler had been a vice president of Commercial Solvents since 1945 and a member of its board since 1950. He started with the company in 1923.

•

Atlas Field Sales Manager

Cornelius D. McGrath has been appointed field sales manager of the Atlas Powder Co.'s chemical sales department. He is succeeded as manager of the industry group responsible for sales of Atlas chemicals to the cosmetic and pharmaceutical industries by Theodore P. Malinowski.

•

Bill 6436 In Committee

H.R. 6436, a proposed amendment to the Federal Insecticide, Fungicide, and Rodenticide Act of 1947, has been introduced in the House of Representatives by Rep. Harold D. Cooley of North Carolina.

The industry-supported bill would remove chemical defoliants, desiccants, and plant regulators from the new food additives law and place them under the Miller insecticide law. The bill has been referred to the sub-committee on science and will be scheduled for hearings after it has been reviewed and reported upon by the departments chiefly concerned – the Department of Agriculture and the Department of Health, Education, and Welfare.

•

Terminate Phosphorus Suit

A suit brought by the Monsanto Chemical Co., St. Louis, against Central Farmers Fertilizer Co., Chicago, in which Monsanto charged illegal use of its trade secrets, was concluded April 24.

Under the terms of a court order, Central Farmers has been forbidden from using Monsanto process data for a period of ten years at any of its plants—except its Georgetown, Idaho, plant which is exempt from the ruling.

Each company has assumed its own costs in the proceedings, and no damages or money payments were provided in the settlement.

•

Recommend Less Fertilizer

The Tobacco Quality Improvement Committee, a group that includes representatives from the dark tobacco industry, the universities of Tennessee and Kentucky, the Dark Tobacco Assn., and the federal grading service, has recommended that growers of dark tobacco use less fertilizer.

The committee feels that the increased use of natural and commercial fertilizers over the past few years has boosted yields at the expense of quality.

•

Del-Mar-Va Assn. To Meet

The Del-Mar-Va Peninsula Fertilizer Association will hold its annual convention at the Hotel George Washington, Ocean City, Md., June 27. Dr. Ralph L. Wehunt of the University of Georgia is to be the guest speaker.

Offer Malathion Data

Supplemental information on the proper formulation and analysis of malathion is being made available by the American Cyanamid Co., New York. The information has been compiled during the eight-year period since the insecticide was introduced.

The U.S. Department of Agriculture recently approved a shorter time interval between the application of malathion and the harvesting of a treated crop. In most cases, growers can now apply malathion 1 day prior to harvesting.

•

Charles A. Parker Dies

Charles A. Parker, Executive Director of the National Aviation Trades Association, died April 21 in Arlington Community Hospital, Arlington, Va., of a heart attack complicated by diabetes. He was 49 years old.

Mr. Parker started working in aviation in 1928, selling rides at air meets. He later managed a scheduled airline operating in the Cape Cod, Mass., area and, in 1936, joined the Intercity Aviation Co. in Boston.

During World War II, Mr. Parker served with the Air Transport Command, attaining the rank of major. He joined the NATA while with Robinson Aviation at Teterboro, N. J., following the war, and became national vice president. In 1949, he was named executive director.

Food Research Stressed At ACS Meeting In Boston

SIX thousand chemists and chemical engineers from all parts of the United States and several foreign countries met in Boston, April 5-10 for the 135th national meeting of the American Chemical Society.

Discussions of interest to the agricultural chemicals industry dealt with qualitative analysis of insecticide formulations, reports on new pesticides, physical and chemical properties of commercial pesticides, and laboratory methods and techniques for research.

A report by Dr. Albert L. Elder, president-elect of the Society and director of research of the Corn Products Company, Argo, Ill., stressed the importance of food research in combatting the Russian threat of world domination.

Said Dr. Elder, "It costs from $740,000 to $3,000,000 to develop a successful pesticide, but perhaps in the future it may be possible to predict with more accuracy which compounds will be useful and safe from the structure of their molecules.

"One of the new interesting developments in this field is the use of nontoxic silica gel, which acts by absorption of the insects' protective wax coating and causes dehydration. There also is hope that further development of techniques for sterilizing insects could be more effective on a cost basis than outright killing."

Dr. Elder noted that chemicals which can increase or retard plant growth offer a challenge to scientists. Some of these compounds can selectively destroy plants, prevent them from pollinating, retard sprouting and cause defoliation.

A "terrific educational program" is needed for the proper use of some of the new chemicals in the insect battle, he emphasized, explaining that chemicals are often misused because the many recommendations for applications are confusing to the farmers.

Another problem exists in the communication between the farmer and manufacturers of fertilizers, the speaker pointed out. Here, even though fertilizer consumption has increased by 4,500,000 tons during the past 18 years, only about 10 per cent of the farmers use as much fertilizer on their two main crops as is recommended by their state experiment stations. The need for fertilizers must be demonstrated through more soil testing, and reasonable assurance must be given to the grower that the application of fertilizers will be profitable.

Shell Chemical Corp. researchers reported on the determination of specific insecticides in pesticide formulations. T. T. White and G. G. McKinley offered a report on the determination of aldrin, dieldrin or endrin in formulations. They advised that these products can be analyzed by a variety of infrared or chemical methods,—the suitability of each method, being dependent on the type of formulation. In infrared spectroscopic methods, the toxicant must be separated from the formulation to avoid interferences due to the solvent, emulsifier or diluent. This, they indicated, can be accomplished by solvent extraction or chromatographic means.

The researchers also reported that phosdrin insecticide can be determined in formulated products by either an acid hydrolysis-hydroxylamine hydrochloride or an infrared spectrophotometric method.

G. L. Mack, New York State Agricultural Experiment Station, discussed the stability of malathion in small package formulations. Decomposition in storage is influenced to some extent by improper packaging. Small packaged general-purpose mixtures are expected to retain their potency for at least one year.

A report on the new pesticide, Thiodan, was prepared by Grannis S. Johnson and Clifford A. Erickson, of the Central Research Laboratories, FMC. Other papers given at the Division of Agricultural and Food Chemistry sessions covered such subjects as the synthesis of DANP; biological activity of a series of halogenated ethyl and vinyl dimethyl phosphates; objective measurement of odor; and toxicology of the microbial insecticides, and of Trolene.

•

CSC Reports Rise In Earnings

Commercial Solvents Corp., New York, reported earnings in the first quarter of 1959 of 24 cents a share, up from 13 cents a share in the first period of 1958. Earnings grossed $665,680 in the '59 quarter.

Maynard C. Wheeler, CSC president, said that he anticipates that this rate of earnings will continue at least through the first half of the year. He noted indications that 1959 will be a good year for fertilizer sales and added that firm prices are expected in nitrogen fertilizers.

•

Hudson District Manager

John F. Farley has been named district manager for multiwalls in the greater New York area by the Hudson Pulp & Paper Corp., New York.

Mr. Farley had been employed by Hudson as a specialist in the development and introduction of new bag types and constructions.

•

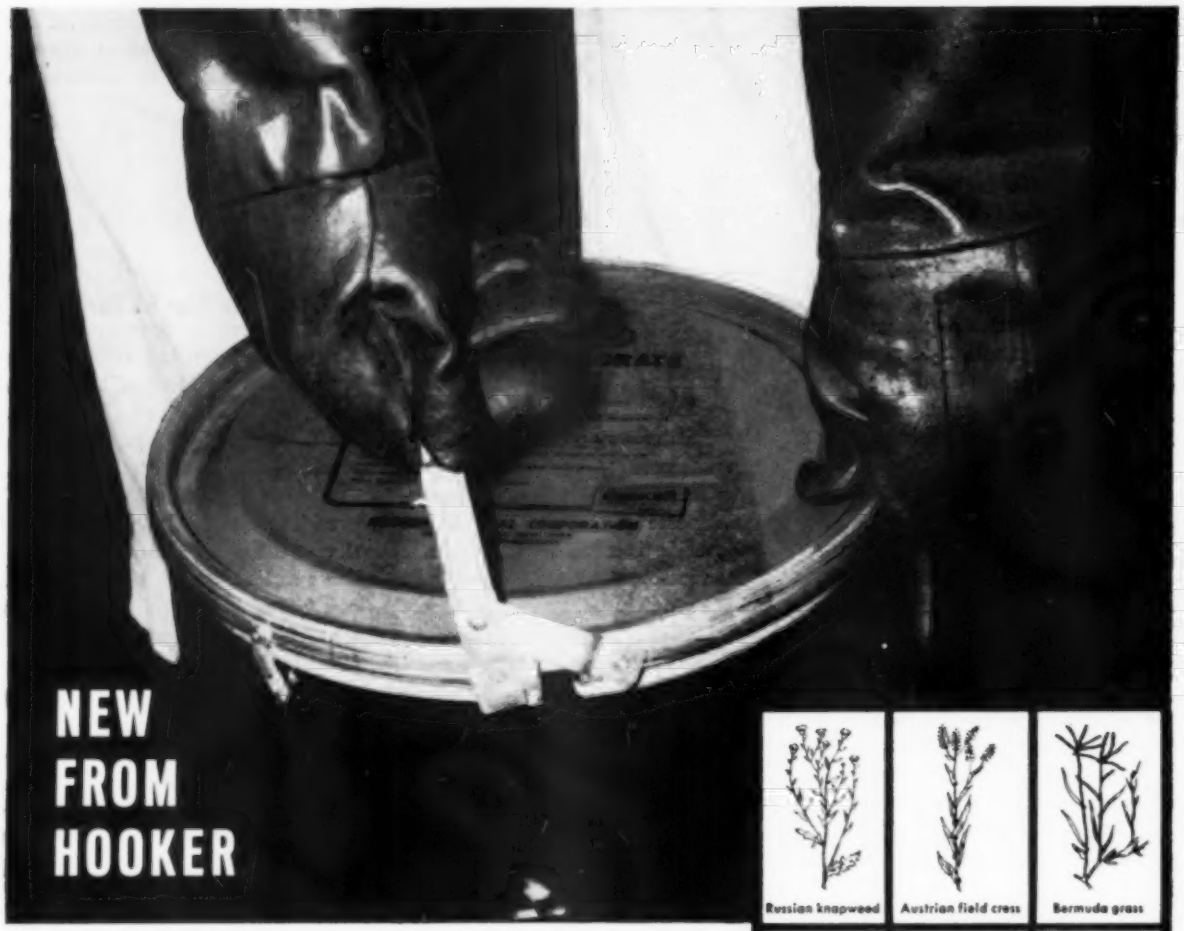
To Technical Field Staff

Robert W. Wert has been appointed a field representative for chemical distributor operations by the Minerals and Chemicals Corp. of America, Menlo Park, N. J. He has been with the company for 14 years and formerly was manager of agricultural sales.

•

1958 Fungicide Tests

The American Phytopathological Society is offering the "Results of 1958 Fungicide Tests." Published privately and issued as a single copy, the results can be secured at $1 per copy from Dr. A. B. Groves, Department of Plant Pathology and Physiology, Winchester Fruit Research Laboratory, Rural Route 3, Winchester, Va.



Russian knapweed

Austrian field cress

Bermuda grass

Bindweed

Canada thistle

Quack grass

A SODIUM CHLORATE DRUM

that's easier to use, empties faster

A tug on the lever opens this new sodium chlorate drum. Note that it has no lugs to open.

The new lever opener makes resealing easier, too. The tight fit preserves the strength of any chlorate you want to leave in the drum.

Empties faster, too. You get the entire head area for an opening with this drum. This makes it easier to empty the chlorate whether you pour, scoop or shovel from the drum. The new drum comes in both 100- and 400-lb. sizes.

Kill **all** these weeds with **one** herbicide

You don't have to stock several chemicals to keep your land free of weeds. Hooker sodium chlorate gets rid of all weed, it sterilizes the soil completely.

Low cost, too. You can treat about a hundred square feet of area for 25¢ worth of sodium chlorate. Dust or spray once and you sterilize the land for at least a year—sometimes two. No costly equipment is needed, either.

Technical aid. Hooker agronomists will help you set up weed control plans and show you how to store and handle sodium chlorate.

Write for descriptive bulletin for further information on how we can help with your weed-killing problem.

HOOKER CHEMICAL CORPORATION
605 BUFFALO AVENUE, NIAGARA FALLS, N. Y.
Sales Offices: CHICAGO • DETROIT • LOS ANGELES • NEW YORK
NIAGARA FALLS • PHILADELPHIA • TACOMA • WORCESTER, MASS.
In Canada: HOOKER CHEMICALS LIMITED, N. VANCOUVER, B. C.

HOOKER® CHEMICALS PLASTICS

Defer Licensing Proposal

At a meeting held in San Francisco, March 31, it was decided that the California Agricultural Aviation Association would not sponsor legislation to license chemical salesmen at the current session of the California legislature.

The meeting, called by the U.S. Department of Agriculture, was attended by representatives of the CAAA, the Agricultural Council of Calif., the Calif. Farm Bureau Federation, the NACA, the University of California, the State Department of Agriculture, the Calif. Fertilizer Association, the State Association of County Agricultural Commissioners, and the WACA.

The group recommended that an effort be made to educate farmers, chemical companies, salesmen, and the public to eliminate the problem without legislation.

•

Register Nabac 25 Label

A commercial label on Nabac 25 has been registered with the U.S. Department of Agriculture for the control of powdery mildew, downy mildew, and angular leaf spot of cucumbers; bacterial spot of peppers and tomatoes; powdery mildew of lilacs and phlox; and damping-off of several vegetables.

Nabac 25 is produced by the Nationwide Chemical Co., Fort Myers, Fla., and has been sold in that state for the past year. A synthetic organic plant bactericide, Nabac 25 is being further tested for the control of other bacterial and fungus diseases. The company offers a data sheet on the new product for use by experimental workers.

•

To Build In Wisconsin

A new fertilizer plant for Wisconsin is scheduled to be constructed this year by Agricultural Chemicals Inc. The exact site for the plant, which is to be in southeastern Wisconsin, has not yet been determined.

R. P. Koos, formerly president-treasurer of the N. S. Koos & Son Co., Kenosha, Wisc., is president-treasurer of the newly-formed Agricultural Chemicals Inc. K. S. Kneiske is vice president and D. R. Guptill is secretary. The proposed plant will produce 40,000 tons of granular, high analysis plant food.

•

Named Assistant Manager

Dr. L. G. Utter, formerly technical service manager for agricultural chemicals has been named assistant manager, agricultural chemicals, by the Diamond Alkali Co., Cleveland, Ohio. Dr. Utter joined Diamond six years ago.

From 1929 to 1944, he was associated with the Brooklyn Botanic Garden in a research capacity and was with the Phelps Dodge Refining Corp. from 1944 to 1953. Recently, Dr. Utter was elected president of the Northeastern Weed Control Conference.

•

Blast Kills 3 In Plant

An explosion in the mixing tanks of the Thompson Hayward Chemical Co., Kansas City, Kans., April 23, killed three men, injured five others, and caused an estimated $1,000,000 damage to the plant. The blast occurred in tanks where the company made 2,4-D herbicides.

•

Pilot-Plant Demonstration

The Tennessee Valley Authority will hold a pilot-plant demonstration June 9, 10, and 11 to exhibit recent developments in fertilizer production technology. The demonstration will be held at the Muscle Shoals laboratories near Shelfield, Alabama.

The program will consist of a series of pilot-plant runs preceded by short discussion periods. Subjects to be discussed include the production of liquid fertilizers, the granulation of high-nitrogen and no-nitrogen grades, and some factors affecting loss of nitrogen during granulation.

•

NPFI Meets June 14-17

The 1959 annual convention of the National Plant Food Institute will be held in the Greenbrier Hotel, White Sulphur Springs, W. Va., June 14 to 17. Program details were still incomplete at press time.

Chemagro Vice Presidents

The board of directors of the Chemagro Corp., Kansas City, Mo., has elected Hugh H. Swink as vice president, sales; Dr. Rosmarie von Rumker as vice president, research and development; and Dr. Robert C. Scott as vice president, manufacturing. All three have served for several years as heads of their respective departments.

Chemagro's administrative, sales, research, and manufacturing facilities have been concentrated at the firm's recently completed Kansas City plant.

•

Elect Hayes Vice President

Jack D. Hayes, assistant general manager of the Hercules Powder Co.'s explosives department, has been elected vice president of the Ketona Chemical Corp. A producer of fertilizers, Ketona is owned by Hercules and the Alabama By-Products Corp.

•

Two Join Bradley & Baker

Charles B. Bagwell Jr. and C. L. Gemmell have been named sales representatives for the Atlanta, Ga., office of Bradley & Baker. Mr. Bagwell covers northern and central Georgia and Mr. Gemmell services customers in northeastern South Carolina.

•

Fertilizer Supplies Ample

The U. S. Department of Agriculture reports that fertilizer supplies for this year's planting period are adequate.

The department said that shortages may occur locally at the height of the spring season because of transportation bottlenecks, but these will be temporary.

•

Acquire B.C. Laboratories

Imperial Development Co., Ltd., has acquired the B.C. Laboratories of Bakersfield, Calif.

•

Southwestern Meeting July 15

The Southwestern Fertilizer and Grade Meeting will be held in the Galvez Hotel, Galveston, Texas, July 15 to 17.

Dust a problem in your material handling?

Here's how Michigan Tractor Shovels help Swift & Company

Swift & Company's plant food division at Madison, Wisconsin has the usual problem encountered in the processing of raw materials such as potash and superphosphate, and in handling the finished plant foods.

Equipment used in these processes is exposed to long hours of continuous maneuvering while handling the bulk materials. Equipment must be durable to withstand the heavy loads, quick stops, and grit of raw material acting on the machine. Swift officials report the one-yard 77 hp Michigan Model 75B shown has given excellent results in meeting these requirements.

Moving potash 110 ft from bin to mixer, Michigan is timed delivering 60 loads (97,200 lbs) per hour. Unit changes direction and speed at flick of power-shift lever. No clutching needed.

Works round-the-clock

"It is dependable," says Madison Assistant Superintendent Harry Peeler. "It worked round-the-clock during our latest two-month rush season. Its only stops were to add fuel, inspect oil, and change operators. We've had no troubles with grit in the power-train . . . and no axle failures."

Ken Kremelling, veteran tractor shovel operator, says, "Michigan's torque converter helps you heap big loads fast. Low bucket-carry helps you keep what you load. Power steer takes you around turns fast. And power shift helps you start back for the next load fast."

See Michigan advantages for yourself

A trial in your plant will show you how these same advantages can pay off for you. Write for details on the size Michigan that interests you—6, 10, 15, 20 or 27 cubic feet; 1, 1½, 1⅝ or 2¼ cubic yards.

Michigan is a registered trade-mark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division
2463 Pipestone Road
Benton Harbor 7, Michigan

CLARK® EQUIPMENT

To Expand Shipping Site

The Texas Gulf Sulphur Co., New York, plans to enlarge its present marine shipping facilities located on the Neches River, south of Beaumont, Texas.

Company officials stated that increased production at Spindletop Dome at Beaumont and additional production at the company's new Fannett Dome some 15 miles away prompted the expansion of its present dock area.

•

Garden First Aid Kit

Chipman Chemicals Ltd., Hamilton, Ontario, has introduced a garden "first aid kit" that contains a selection of five pest control chemicals for home gardeners and a booklet on the control of common garden pests.

The kit holds a tin of ant and grub killer (in western Canada this is replaced by a 2½ per cent Aldrin dust); a ready-to-use pumper dust gun containing all-purpose flower and garden dust; a sifter-top tin of Atox, a rotenone-based insecticide for use on vegetables; a can of Herbate 2,4-D weed killer; and a Ridsect aerosol insecticide for household insects.

•

Cyanamid Research Grant

Synthetic insecticides are being studied for their effectiveness in the control of northern cattle grubs by Dr. E. A. Tunnicliff of Montana State College under a grant awarded to the college by the American Cyanamid Co., New York.

Among the systemics being evaluated is Dimethoate, Cyanamid's insecticide which has shown promise for the treatment of late-stage grubs in the backs of cattle.

•

Named to Station Staff

Dale N. Moss has been appointed to the staff of The Connecticut Agricultural Experiment Station, New Haven. Dr. Moss will study the effect of natural and man-made environments upon the growth of plants. He will investigate ways of adjusting population and environment to give greatest efficiency in the growth of trees and the production of field crops such as corn and potatoes.

•

Added To Hopkins Staff

The Hopkins Agricultural Chemical Co., Madison, Wisc., has named Lynn K. Brunn as technical service manager. He formerly was associated with the Atlas Powder Co. in agricultural chemicals marketing activities and the Sherwin-Williams Co., as an entomologist.

The Hopkins Co. formulates Warfarin products and supplies pesticides to the canning and truck crop industry in the upper mid-west.

•

Building in New Mexico

Ravel Brothers, Albuquerque, N. Mex., has started the construction of a fertilizer plant on a 15 acre tract in that city. Said to be the first basic fertilizer production plant in the state, the plant will manufacture superphosphate and have a daily capacity of 50 tons.

•

Raymond Names Lundeen

Howard Lundeen has been appointed quality control supervisor in charge of all quality control operations in the Raymond Bag Corp.'s plants at Middletown, Ohio, and Richmond, Va. He had been associated with Pillsbury Mills, Inc. and the Jones & Laughlin Steel Corp.

•

Canadian Firms Profit

Canadian pesticide manufacturers have reported an overall net profit of 3.3 cents per sales dollar on their 1958 operations, according to a survey conducted by the Canadian Agricultural Chemicals Association.

Since 1947, when the annual sales of pest control products in Canada amounted to $7,000,000, the volume of sales has tripled, the C.A.C.A. said. Twenty years ago, insects destroyed about 25 per cent of all farm production in Canada, it is estimated. In 1958, however, this estimate was reduced to about 12 per cent of a much larger agricultural output.

NY Borough Sprays Mosquitos

The Borough of Queens in New York, N. Y., is spraying hundreds of acres of swampy, low-lying land with DDT to control mosquitos. The spraying began in mid-April and will continue until Labor Day.

Two trucks are fogging with a mixture of fuel oil and concentrated DDT. Appropriations for mosquito control had been eliminated from this year's budget for Queens but the City's Highway Department, which is carrying out the extermination program, had a surplus of 1,000 gallons of chemicals from last year. Two years ago, the borough used helicopters to spray breeding areas but this is said to have proved too expensive and was dropped.

•

Named Monsanto Technologist

Walter H. Stanton, a member of the engineering department of Monsanto Chemical Company's Plastics Division at Texas City, Tex., has been appointed a Technologist effective April 1.

Mr. Stanton, who has been manager of engineering planning at Texas City since 1956, joined Monsanto in 1942.

•

Globe Livestock Spray

Globe Laboratories, Inc., Fort Worth, Texas, is offering a dairy cattle and livestock aerosol spray containing tabatrex. The spray is said to effectively repel horse flies, stable flies, horn flies, house flies, mosquitos, and gnats.

•

Bemis Plastic Bag Plant

The Bemis Bro. Bag Co., St. Louis, is building a plastic bag plant with facilities for the extrusion of polyethylene liners and the manufacture of plain and printed polyethylene bags at Union City, south of Oakland, Calif.

James White, superintendent of the Bemis Plastic Package plant at Terre Haute, Ind., will serve as production manager of the new plant which will begin operations this summer.

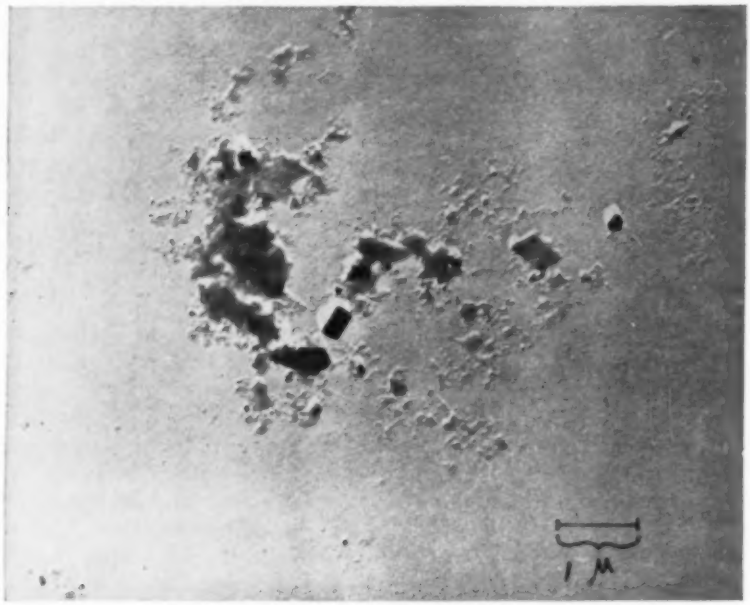
for best uniform results

use TAKO *with confidence*

QUALITY & SERVICE SINCE 1939

(the natural colloidal kaolinitic kaolin)

TECHNICAL FACTUAL INFORMATION THROUGH RESEARCH



Electronphotomicrograph, TAKO

Magnification 4 (Negative, 5100 diameters; print, 15,000 diameters). On the print, 1mm corresponds to 0.067 microns. Distinct rectangular forms are observed in the range from 0.07 to 0.4 microns in length. Less definite evidence is seen for particles of still smaller size.

pH Value 4.4
Bulk Density—lbs. cu. ft.
Loose—Approx. 20 lbs.
Packed— " 41 "
Porosity 130%
Specific Surface—(CM^2-22,700)
Particle Type—Crystal Flat Rectangular Plates and Crystal Aggregates
Specific Gravity—2.62
Particle Size Distribution—Sedimentation, using Andreasen Pipette Procedure

SIZE (Microns)	EQUAL or FINER %	GROUP %
.5		54.0
.5	54.0	
1.0	64.0	10.0
2.0	75.6	11.6
3.0	81.9	6.3
4.0	85.5	3.6
5.0	87.6	2.1
6.0	89.9	2.3
7.0	91.8	1.9
8.0	92.7	0.9
9.0	93.8	1.1
10.0	94.3	.5
10.0		5.7

ABSOLUTELY

NO MICA

GUARANTEED LESS 1% FREE MOISTURE

"TAKO" **Airfloated Colloidal Kaolinitic Kaolin is a natural practically chemically pure inert colloid with exceptional qualities. It excels as a diluent-carrier in formulations of insecticides-pesticides and as a prilling and coating agent in the production of high analysis fertilizers. It gives increased workability-dispersion. Its purity is highly desirable due to its compatibility with chemicals. Its colloids give increased adhesive—adsorptive properties.**

"TAKO" **used in large tonnage for years most successfully and economically as a diluent-carrier in the formulation of insecticides-pesticides and as a prilling and coating agent in the production of high analysis fertilizers.**

"TAKO" **This Natural Very Pure Colloidal Kaolinitic Kaolin is produced from our Company-owned mines, processed under straight-line production with the very latest electric controlled automatic equipment — resulting in our very low per ton established price for this high quality colloidal product.**

NON-ABRASIVE • NON-HYGROSCOPIC • NON-CAKING • FREE-FLOWING

"TAKO" Is Produced Under Laboratory Control — ALWAYS UNIFORM IN QUALITY

IT WILL PAY TO INVESTIGATE "TAKO" FOR YOUR REQUIREMENTS

THE THOMAS ALABAMA KAOLIN COMPANY

2412 KEN OAK ROAD, BALTIMORE 9, MARYLAND, U. S. A.

MINES, PLANTS & SHIPPING POINT — HACKLEBURG, ALABAMA

Campbell Joins Monsanto

Dr. Joseph D. Campbell Jr. has joined the development department of the Monsanto Chemical Co.'s organic chemicals division at St. Louis, Mo., as a project manager in the agricultural chemicals section. He had been with the Olin Mathieson Chemical Corp.

At the same time, Lester E. Goodheart joined Monsanto's agricultural chemicals sales department to serve in the Champaign, Ill., area.

•

Penick Realigns Division

In implementing a recently announced realignment of its sales and service division, S. B. Penick & Co., New York, has announced the following appointments:

Frank Seeland, vice president, continues as manager of the newly-named Farm Chemical and Insecticide Division which has added antibiotic feed supplements to its line of products; William A. Thawley, former sales manager of the New York Quinine & Chemical Works, Inc., has been appointed director of sales coordination for the entire Penick organization; and Harold A. Meyer, vice president, now is in charge of the Botanical & Allied Products Division, with William W. Bell, vice president, as assistant manager.

•

Chase Acquires Nafco

The Chase Bag Co., New York, has acquired Nafco Bags, Oakland, Calif., from National Automotive Fibres, Inc. The present sales organization of Nafco will continue as the Nafco Bags Sales Division of Chase. Headquarters for the new division will be in San Francisco.

•

Start Sulfuric Acid Plant

Construction has begun at Pine Bend, Minnesota (12 miles south of St. Paul) on a 240 ton per day sulfuric acid contact plant for North Star Chemicals, Inc. The Titlestad Corp., New York, are engineering and supplying the plant and will supervise initial operations. The plant is expected to be completed during the last quarter of '59 and will be the only sulfuric acid plant in operation in Minnesota.

•

CSC Names Jolley

R. Paul Jolley has joined the agricultural chemicals department of the Commercial Solvents Corp., New York, as a sales representative. He will make his headquarters at CSC's Atlanta, Ga., office.

For the past four years, Mr. Jolley served as chief fertilizer control official for the Georgia Department of Agriculture. Prior to this, he was a sales representative for the Virginia-Carolina Chemical Corp., Richmond, Va., for eight years.

•

V-C Elects Vice Presidents

Charles T. Harding and Douglas W. Laird have been elected vice presidents of the Virginia-Carolina Chemical Corp., Richmond, Va. Mr. Harding serves as vice president in charge of fertilizer manufacturing and Mr. Laird is in charge of purchasing.

Mr. Harding joined V-C in 1918. He was named general manager in 1951. Mr. Laird previously was manager of the purchasing department. He joined V-C in 1948.

•

Cyanamid Grant To O.S.U.

Oklahoma State University, Stillwater, Okla., has accepted a grant-in-aid from the American Cyanamid Co., New York, to study beef cattle parasites. Dr. L. E. Hawkins of the Agricultural Experiment Station at Stillwater is in charge of the research studies.

•

Israel Supplying Brazil

An agreement has been signed in Tel Aviv between the state-controlled Israeli Company, Fertilizers and Chemicals Ltd., of Haifa, and Nitro Quimica, of Rio de Janeiro, Brazil, under which Israel will supply some of the plant, technical staff, and technical aid for the building of a dicalcium phosphate plant in Brazil.

The same firm recently received an order from the French Krebs concern for a similar plant in Belgium.

Offer Corn Cob Fraction

Cargill, Inc., Minneapolis, Minn., is offering ground "Corn Cob Fraction", which is composed primarily of the soft absorbent parts of the corn cob, to fertilizer manufacturers.

The new product is said to have a low weight for added bulk, is less than five per cent moisture, is free flowing, and has a uniform particle size.

•

WACA Meeting Oct. 13

The fall meeting of the Western Agricultural Chemicals Association will be held in the Villa Hotel, San Mateo, Calif., Oct. 13 to 14.

The program lists speakers from Washington, D. C. and Kansas City, Mo. Two panel discussions will cover five areas of business procedures and five aspects of the marketing of agricultural chemicals in the western states.

•

New Ammonia Plant in Peru

Peru, traditionally a producer and exporter of organic fertilizers, has started operations at its first synthetic ammonia plant at Callao. Designed and built by Montecatini of Italy, and employing a Fauser-Montecatini process, the plant will produce in addition to ammonium sulfate and ammonium nitrate fertilizers, anhydrous ammonia, nitric acid and ammonium nitrate.

The $10 million Callao installation will be operated by Fertisa—Fertilizantes Sinteticos S.A.—with headquarters in Lima. Peruvian investors subscribed most of the 5 million dollar capital of Fertisa, while the remaining financing was secured on a long-term loan from an Italian bank.

An interesting feature of the fertilizer grade ammonium nitrate plant is its use of a granulating device based on revolving disks giving a prilled product perfectly suitable for direct distribution on the ground. While this technique has been used by the European pharmaceutical and candy industries, it is the first time that it will be employed in the Western Hemisphere.

Offer Randox Granules

A new, granular form of Randox, Monsanto Chemical Co.'s preemergence herbicide for annual grasses and certain broadleaf weeds in corn, soybeans, and other crops, is being offered to Illinois growers during 1959.

•

Cominco Building In Canada

The Consolidated Mining & Smelting Co. has announced the start of construction of a urea plant adjacent to Cominco's present fertilizer operations at Calgary, Alta., Canada. The new plant will have a capacity of more than 36,000 tons annually.

•

Du Pont Herbicide Movie

A movie featuring the fate of five noxious weeds is being offered for showing before agricultural groups by E. I. du Pont de Nemours & Co., Wilmington, Del.

Du Pont Tryben 200 weed killer is used in the film to control field bindweed, leafy spurge, Russian knapweed, bur ragweed, and Canada thistle.

NOW

Pikes Peak granules at new low prices!

Available in any mesh size.

When you buy Pikes Peak Clay
you get one carrier that:

- ▲ Is highly compatible with both organic phosphates *and* hydrocarbons.
- ▲ Is perfect for concentrates, for adjusting bulk density, or fluffing field strength dusts.
- ▲ Has exceptionally low moisture content and pH of 5.
- ▲ Is highly absorbent, less hydroscopic.
- ▲ Has remarkably free flowability.
- ▲ Protects the stability of your finished product or concentrate.

Write today or call GRaceland 7-3071 in Chicago to find out more about Pikes Peak Clay and obtain samples for testing.

G R C GENERAL REDUCTION COMPANY
1820 ROSCOE STREET • CHICAGO 13, ILLINOIS

Fertilizer Research on Alfalfa

Work will begin this spring at the Mosca-Hooper (Colo.) experimental plots on a new phosphate fertilizer experiment with alfalfa.

William T. Franklin, Colorado State University Experiment Station agronomist and project director, said the objective will be to note how rates, replacements and sources of phosphate fertilizers affect alfalfa yields. Land which was planted with tall wheatgrass will be used. If possible, he said, the experimental site will be chiseled to a depth of two feet or more before plowing out the tall wheatgrass.

Rates of phosphate to be tried will be 50 and 200 pounds per acre with either treble superphosphate or dicalcium phosphate as the carrier. Fertilizer will be applied by plowing down, drilling and broadcasting. The plots will receive surface irrigation in order to establish a good alfalfa stand.

Besides Mr. Franklin, other CSU researchers who will participate in the experiment are agronomists Willard R. Schmehl and S. D. Romsdal. The work will run about four years.

•

New District Representative

C. F. Stanton has been named district representative for the Highway Equipment Co., Cedar Rapids, Iowa. He will cover Colorado, Kansas, Western Missouri, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming.

•

To Represent Metalsalts

Guardian Chemical & Equipment Co. Ltd., Montreal, Quebec, has been appointed by Metalsalts Corp., Hawthorne, N. J., to handle the sale of Metalsol, a mercury based slimicide.

•

George W. Moody Dies

George W. Moody Jr., president of the Florida East Coast Fertilizer Co., Homestead, Fla., died April 22. He was 68.

Mr. Moody, one of the founders of the fertilizer firm, became president in 1944.

Two Join Butcher Co.

T. A. Hall A. W. Austin, Jr.

The L. H. Butcher Co. subsidiary of the Udylite Corp., Portland, Ore., has announced the appointments of A. W. Austin Jr. and Thomas A. Hall as technical sales representatives in the Yakima Valley fruit region. Both men will be headquartered in Yakima, Wash.

Mr. Austin has owned and operated an orchard in Yakima and has operated a commercial agricultural spray service. Mr. Hall has been in aerial crop dusting since 1947 with the Central Aircraft and Economy Helicopter Service of Yakima. He started the first helicopter service west of the Mississippi.

•

Dow Agrochemicals To Build

Dow Agrochemicals, Limited, will build a factory in King's Lynn, Norfolk, England, to manufacture Dowpon under license from the Dow Chemical Co., Midland, Mich.

The British company, organized to manufacture and market the selective grass killer in the British Commonwealth, announced that an industrial development certificate has been received from the Board of Trade to complete the first step in the project.

•

CSC Names Marshall

The Commercial Solvents Corp., New York, has named Paul M. Marshall Jr. to its agricultural chemicals sales staff. Mr. Marshall is assigned to the company's St. Louis district office. His territory will include Missouri and Iowa.

•

West Virginia Sales Meeting

Some 25 area sales representatives and district managers of the Multiwall Bag Division of the West Virginia Pulp and Paper Company attended a two day meeting in St. Louis April 9-10. The sessions included four question-and-answer Product Familiarization Clinics and a tour of the firm's recently-acquired St. Louis plant.

The clinics dealt with sales and technical aspects of the use of multiwall extensible paper bags, especially in shipments of fertilizer, feeds, and Portland cement.

•

Illinois Fertilizer Conference

An Illinois Fertilizer Industry Conference, June 29 and 30, will include a discussion of current soil fertility research in Illinois, a review of fertilizer recommendations, and latest developments on revision of Illinois fertilizer laws. The conference is designed for manufacturers and their representatives and will be held at the University of Illinois, Urbana.

•

Lucas Heads Atlas Office

William R. Lucas has been named manager of the Atlas Powder Co's regional chemical sales office in Chicago. He had been assistant manager of the company's New York regional office.

Edward M. Simon Jr. has replaced Mr. Lucas at New York.

Cyprex For Scab Control

Cyprex, a fungicide made by the American Cyanamid Co., New York, has been accepted by the U.S. Department of Agriculture for use in the western states for the control of pear scab through first cover sprays.

In December of last year it was registered for the control of apple scab through first cover sprays.

•

Brown Is Sales Manager

Herman R. Brown has been named sales manager of the Payloader Division of the Frank G. Hough Co., Libertyville, Ill. He has been associated with the company for 14 years.

In other personnel moves announced by the company, Kenneth B. Larkin was named Eastern regional manager. Robert L. Knox now is manager of the central region and Donald O. Ross is Western regional manager.

World Fertilizer Review Indicates Increase In Supplies

In the fertilizer field throughout the world, the noticeable trends are for supplies of nitrogen, phosphoric acid, and potash to increase at an accelerating rate. While consumption of nitrogen continues at a fairly constant high rate, rates of increase in phosphoric acid and phosphate consumption, although higher in 1957 than in 1956, showed signs of falling off in 1958.

These findings are contained in the "Annual Review of World Production and Consumption of Fertilizers, 1958" by the Food and Agricultural Organization of the United Nations.

The report states that so far as trends in the kinds of fertilizers are concerned, the tendency seems to be for a large proportion of nitrogen and phosphoric acid supplies to be in the form of complex fertilizers at the expense of ammonium sulfate and ordinary superphosphate.

Although the increase in total production of all fertilizers in 1957 over 1956 (8 per cent) was greater than in the previous years, the estimated increase in 1958 (3 per cent) is much smaller. The increase in nitrogen production in 1957 (8 per cent) was slightly higher than in 1956, and the estimated increase for 1958 is still higher. Phosphoric acid and potash production in 1957 both increased more than in 1956, potash by nearly three times as much, but in 1958 the estimates of production of both types of fertilizer are practically unchanged from 1957. In estimates of production in 1958, nitrogen has overtaken phosphoric acid and potash has fallen markedly behind.

The rate of increase in nitrogen production in Europe is noted as being higher in the 1958 estimates (13 per cent) than it was in 1957 (9 per cent). Production in North America, to which the United States contributes over 90 per cent of the total, continued in 1957 and 1958 to show a decline in the rate of increase, but a recovery to a 10 per cent increase is forecast for 1959.

Conservative forecasts for 1959 indicate a tendency for the rate of increase in consumption to accelerate.

UNITED-HECKATHORN
...new source of Fluorides

Fluorides from domestic raw material by a basic new process assures stable, reliable availability of these important chemicals. Long-term supply contracts.

- cryolite
- ammonium bifluoride
- ammonium fluoride
- sodium fluoride
- aluminum fluoride
- other fluoride compounds on request

WRITE FOR FURTHER INFORMATION

UNITED Heckathorn

600 S. 4th STREET, RICHMOND 4, CALIFORNIA

SALES OFFICE: 415 LEXINGTON AVE., NEW YORK, N.Y.

Reorganize Re-Mark Company

The reorganization of the Re-Mark Chemical Company, Miami, Fla., under a new management set-up has been approved by the United States District Court for Southern Florida. The new plan will permit Re-Mark to expand its sales with an intensified promotional and distribution program.

New financing in the amount of $350,000 has been introduced by William C. Webb of Miami and Melvin Goldberg of New York through their purchase of Class A and B stock in Re-Mark, plus additional financing and new credit commitments from suppliers.

•

Water Soluble Plant Food

Agrico Water Soluble plant food is being made available to home gardeners, golf courses, and nurserymen this spring by the American Agricultural Chemical Co., New York.

The fertilizer is a granular 17-17-17 formulation and is completely soluble, even in cold water.

•

Joins Nitrogen Division

Thomas G. Runion has joined the Nitrogen Division, Allied Chemical Corp., New York, as an agricultural sales representative in Illinois.

•

Southern Control Officials

The 17th annual convention of the Association of Southern Control Officials will be held at the Velda Rose Motel in Hot Springs, Ark., June 9 and 10. J. A. Noone of the National Agricultural Chemicals Association, Washington, D. C., will address the group on the regulation of pesticides.

Also appearing on the program will be Woody N. Miley, Agricultural Extension Service, Little Rock, Ark., who will discuss the value of county and area fertilizer consumption statistics in the agricultural extension service education program. Dr. Charles Lincoln, head of the department of entomology, University of Arkansas, Fayetteville, Ark., will talk about the effect of resistance and formulation on insect control.

Other speakers include: Dr. D. A. Hinkle, University of Arkansas; Grover C. Dowell, Agricultural Extension Service, Little Rock; Dr. R. L. Beacher, NPFI, Fayetteville; and Arthur Gentry, Arkansas Plant Food Co., Little Rock.

•

Acquires Modesto Firm

The Collier Carbon & Chemical Corp., Los Angeles, has acquired all outstanding stock of the Chemical Fertilizer Co., Modesto, Calif.

Although Collier controlled, Chemical Fertilizer Co. will retain its corporate identity and will continue to market its fertilizer products and also will package some of Collier's Brea brand fertilizers.

•

Dedicate Fruit Insect Lab.

A fruit insects pesticide chemicals laboratory was dedicated April 5 at Vincennes University, Vincennes, Indiana. Operated by the Entomology Research Division, Agricultural Research Service, USDA, the new laboratory offers facilities for the study of the biology and control of fruit insects and has a chemical laboratory for chemical studies of residues.

Donald W. Hamilton is in charge of the biology and control section and John E. Fahey supervises chemical investigations at the laboratory.

1958 FUNGICIDE TESTS

The complete results of 1958 fungicide tests, listing response of various crops to commercial and experimental fungicides, are contained in a bound booklet.

Price: $1.00

Postpaid if check accompanies order — postage and handling charges added where orders must be billed.

Send check with order to:

Dr. A. B. Groves
Winchester Fruit Research Lab.
Rural Route 3
Winchester, Virginia

Named Promotion Director

Dr. Arthur M. Smith has been named director of agricultural promotion and development for Mathieson urea, a product being manufactured by the recently formed SunOlin Co., North Claymont, Del.

SunOlin is a jointly owned subsidiary of the Olin Mathieson Chemical Corp. and the Sun Oil Co. Before joining Olin Mathieson in 1948, Dr. Smith had been vice president and technical director of Synthetic Nitrogen Products Corp. In his new post, he will concentrate chiefly on the area from Michigan to the eastern seaboard.

•

TVA Program For Maine

Farmers in Maine will, for the first time, participate this season in the test-demonstration farm program which the Tennessee Valley Authority, in cooperation with the Agricultural Extension Services, is carrying on in 30 states.

Test-demonstration work is being initiated on 18 farms in York County in southwestern Maine.

•

Bunker Hill to Locate New Plant

The Bunker Hill Company still hasn't decided whether to build its $10 million fertilizer plant at Kellogg, Idaho, or Kennewick, Wash., president John Bradley advised recently. A major factor in deciding on the plant location is by-product gypsum in the contemplated operation.

"In Kellogg" said Mr. Bradley, we can conveniently dispose of the gypsum, but there appears to be little likelihood of disposing of it profitably for agricultural or industrial use.

"At the site on the Columbia River near Kennewick, we may be able to market the gypsum at a price which will outweigh the freight and operating advantages of Kellogg."

The company, whose major mining operations are located at Kellogg, announced plans to build the plant last year and took an option on an industrial site near Kennewick. Mr. Bradley gave no indication when a decision will be made or construction started.

Manager of Sohio Sales

George W. Cosper has been named manager of agricultural sales for the Sohio Chemical Co., Lima, Ohio. He has been assistant sales manager since joining the company in 1956.

•

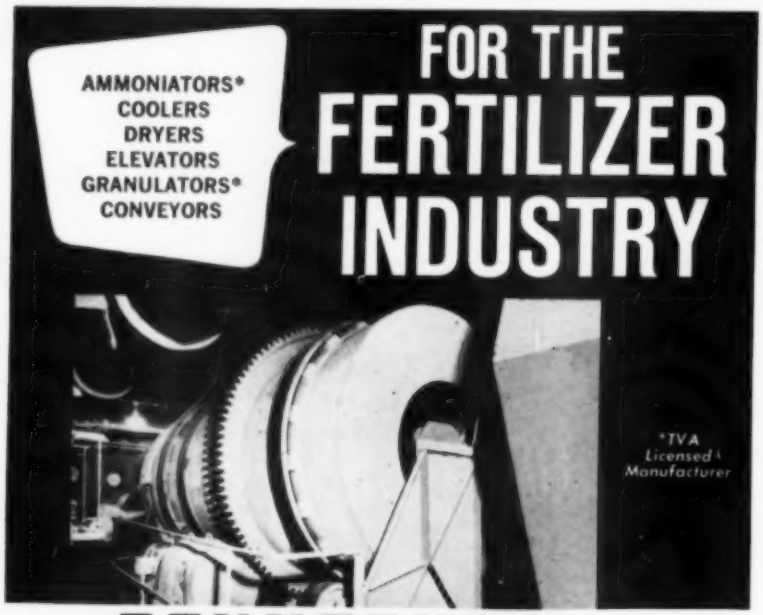
Complete Brine Well

The second in a series of new brine wells being drilled by the Great Lakes Chemical Corp. at Filer City, Mich., has been completed. The company is reported to be carrying out an over-all expansion program and has added new tank cars and trucks and enlarged facilities for handling bulk shipments of bromine, as well as the series of brine wells.

•

Heads New York Division

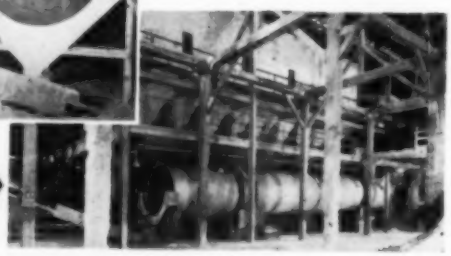
William F. Hazlewood has been named manager of the New York division of the Multiwall Bag Department, Hudson Pulp & Paper Corp., New York. Mr. Hazlewood joined Hudson seven years ago.



RENNEBURG

7'6" dia. x 15' heavy duty Continuous Combination Ammoniator-Granulator — With 40 HP motor and Renneburg exclusive motorized cam-actuated knockers. Unit handles 70 tons per hour granular fertilizer throughput.

24-million BTU/Hr capacity Renneburg Refractoryless Furnace used with 8' dia. x 60' Dryer (left), parallel with 8' x 60' Counter-Current Cooler.



Renneburg Rotary Drying Unit (behind Counter-Current Cooler in foreground) — Equipped with 5-compartment insulated cloth-type collectors, having orlon dust tube filters for effective air pollution control.

Literature and information on request.

EDW. RENNEBURG & SONS CO.

2639 Boston Street, Baltimore 24, Md.

Pioneers in the Manufacture and Development of Processing Equipment for over 85 years.

Allen Is District Manager

Franklin Allen has been appointed district manager in the western region for the American Cyanamid Co.'s agricultural division. He succeeds H. H. Phillips, who was named assistant regional manager.

During the twelve years he has been with Cyanamid, Mr. Allen has held various posts in the former Phosphates and Nitrogen Division and the Agricultural Division. Most recently, he was assistant district manager in the western region.

•

Acquire Canada Distributors

The Witco Chemical Co., New York, has purchased a controlling interest in P. N. Soden and Co., Ltd., Canadian chemical distributors. P. N. Soden maintains offices and warehouses in both Montreal and Toronto.

•

New Fertilizer Additive

A new fertilizer additive, especially designed for treating perennial crops with molybdenum, has been developed by the Climax Molybdenum Co., a division of American Metal Climax, Inc., New York.

Known as Moly-Gro Fertilizer additive, the material is being marketed primarily to commercial fertilizer producers for blending with their products. It contains a minimum of 42 per cent active molybdenum.

•

Van Drasek Joins Geigy

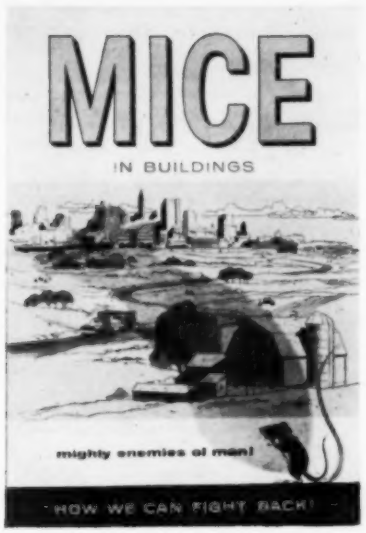
Gail Van Drasek has joined the Michigan sales staff of Geigy Agricultural Chemicals, division of Geigy Chemical Corp., Ardsley, N. Y. He formerly was employed by the Watervliet (Michigan) Fruit Exchange.

•

S. C. Growth Factors Study

A research project to determine what factors limit the production of corn-soybeans, and cotton will be initiated this spring by the South Carolina Agricultural Experiment Station. The project will be supported, in part, by a grant from the National Plant Food Institute.

Equipment, Supplies, Bulletins



The Wisconsin Alumni Research Foundation, Madison, Wisc., is offering a new booklet entitled "Mice in Buildings." The booklet is designed for sanitarians, agricultural leaders, farm youth groups, pest control operators, teachers, health agencies, and others interested in rodent control.

The booklet illustrates the most effective types of bait stations and shows how and where baits and traps should be placed. Also, it describes effective procedures for reducing mouse invasions into buildings.

•

C.I.C. Fly Control Folder

The Chemical Insecticide Corp., Metuchen, N. J., has prepared a booklet that describes a recent experimentation program conducted by the company to develop an insecticide that could be fogged on fruit, remain odorless, tasteless, and be approved by the FDA..

Chemicals tested were Pyrix 10, Tifacide 107, Chem Fog T, Chemation T, and Chem-Germ. The booklet, "Drosophila Fly Control," is available from the company.

•

Add To Gustafson Line

The Gustafson Manufacturing Co., Corpus Christi, Texas, has announced the addition of a CS-G model for chemical band treatment to its current line of Chem-Soil Mixers.

The new model was developed for the application of Terraclor fungicide to control Southern blight on peanuts. It may be used also for dust and granular insecticides, herbicides, and all dry fertilizer materials, the company said. Complete information on the mixer can be obtained from the company at P.O. Box 2409, Corpus Christi.

•

Miller Automatic Palletizer

An automatic palletizer has been introduced by the Miller Engineering Corp., Louisville, Ky., that is recommended for bag stacking operations in two and three-shift plants. The palletizer is completely automatic.

•

New FP Feed Pump

The Fischer & Porter Co., Hatboro, Pa., has introduced a new chemical solution feed pump that features a hydraulically balanced Teflon slack diaphragm. The diaphragm is not connected to the plunger and is unconditionally guaranteed for the life of the pump.

The pump has a capacity of up to 65 gallons every 24 hours, an operating pressure up to 125 psi, and a maximum continuous temperature rating of 100F.

•

Witco Offers Emcol Folder

A description of Witco Emcol emulsifiers H-710, H-712, and H-714 for 2,4-D and 2,4,5-T ester concentrates, along with a listing of typical weed-killer formulations, is presented in Emulsol Technical Bulletin No. 55, offered by the Witco Chemical Co., New York.

•

Pre-Emerge Spray Kit

The Tryco Manufacturing Co., Decatur, Ill., has developed a pre-emerge spray kit that will fit all row crop planters to apply spray materials in a band on the crop rows at the same time the seed is being planted.

Anchor Dealer Aids

Western Phosphates, Inc., Garfield, Utah, and Wilson & Geo. Meyer & Co., Intermountain, San Francisco, have prepared a wide variety of material on Anchor Brand phosphate fertilizers for use by dealers.

Included are Anchor "Crop Quiz" pads, dealer ad proofs, a broadside for dealers' use, postcard ad reprint mailers, newspaper ad mats, and Anchor bag mats.

•

Johns-Manville Folder

The ability of Celite to coat a granule or prill of fertilizer is dramatized in a brochure recently released by the Johns-Manville Co., New York.

Celite, a diatomite, is said to be highly absorbent and have an affinity for both the granular and prilled fertilizers.

•

Improved Fertilizer Box

The Gaylord Container Division of Crown Zellerbach Corp., St. Louis, Mo., has developed a shipping container that is said to achieve maximum stacking strength while eliminating pinching and tearing of a polyethylene bag in which fertilizer is packed.

The container was developed for the Summers Fertilizer Co., McKeesport, Pa. The box consists of two full-telescope parts which, when folded, form a smooth top and bottom for the polyethylene bag.

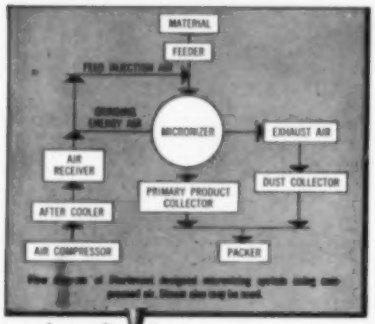
•

Polyethylene Bag Seal

Chippewa Plastics, Inc., Chippewa Falls, Wisc., has developed a flush, weld-type seal for its heavy-duty, polyethylene bag which is said to bring the strength of the sealing areas up to virtually the strength of the polyethylene film itself.

Need ½ to 44 Microns?

Sturtevant Micronizers* Make 325 Mesh Obsolete



Production Model (15 in. chamber)

One Operation Reduces, Classifies

Sturtevant Micronizers grind and classify in one operation in a single chamber—provide fines in range from ½ to 44 microns to meet today's increased product fineness needs. Can handle heat-sensitive materials.

No Attritional Heat

Particles in high speed rotation, propelled by compressed air entering shallow chamber at angles to periphery, grind each other by violent impact. Design gives instant accessibility, easy cleaning. No moving parts.

Classifying is Simultaneous

Centrifugal force keeps oversize material in grinding zone, cyclone action in central section of chamber classifies and collects fines for bagging. Rate of feed and pressure control particle size.

Eight Models Available

Grinding chambers range from 2 in. diameter laboratory size (½ to 1 lb. per hr. capacity) to large 36 in. diameter production size (500 to 4000 lbs. per hr. capacity). For full description, request Bulletin No. 091.

Engineered for Special Needs

A 30 in. Sturtevant Micronizer is reducing titanium dioxide to under 1 micron at feed rate of 2250 lbs. per hr. For another firm, a 24 in. model grinds 50% DDT to 3.5 average microns at a solid feed rate of 1200-1400 lbs. per hr. A pharmaceutical house uses an 8 in. model to produce procaine-penicillin fines in the 5 to 20 micron range. Iron oxide pigment is being reduced by a 30 in. Micronizer to 2 to 3 average microns.

Sturtevant will help you plan a Fluid-Jet system for your ultra-fine grinding and classifying requirements. Write today.

Can Test or Contract Micronizing Help You?

Test micronizing of your own material, or production micronizing on contract basis, are part of Sturtevant service. See for yourself the improvement ultra-fine grinding can contribute to your product. Write for full details. STURTEVANT MILL CO., 123 Clayton St., Boston, Mass.

*REGISTERED TRADEMARK OF STURTEVANT MILL CO.

Paragon Sprayer Folder

Mobile Paragon power and hand sprayers for lawn and garden use are described in a bulletin offered by the Campbell-Hausfeld Co., Harrison, Ohio. Featured are 15 and 30 gallon power sprayers with pressures up to 200 pounds and mobile hand sprayers.

•

Thayer Scale Bulletins

The Thayer Scale Corp., Pembroke, Mass., has available two bulletins that describe various types of automatic checkweighers and ten main types of automatic scales. Specifications and operational diagrams are included in the booklets.

•

New Hudson Sealer

The Multiwall Division of the Hudson Pulp & Paper Corp., New York, is offering a new moisture vapor transmission sealer for in-plant use. The sealer is said to permit the use of multiwall bags for many products regularly shipped in drums. The Hudson sealer fits into a filling line and operates at the regular line speed of 32-48 feet per minute. It is positioned immediately following the sewing head and, employing both heat and pressure, it applies polyethylene tape for positive protection.

•

U. S. Borax Bulletin

The United States Potash Co., division of the United States Borax & Chemical Corp., New York, has prepared a bulletin on Solubor, formerly polybor-2, a concentrated source of boron.

Developed especially for sprays, dusts, and liquid fertilizers, Solubor can be included in established, routine applications or can be applied with irrigation water.

•

Delavan Nylon Nozzle

The Delavan Manufacturing Co., West Des Moines, Iowa, has introduced a nylon nozzle for use in agricultural spraying. The nozzle is said to withstand the corrosive effects of agricultural chemicals.

The available nylon parts consist of the nozzle cap, nozzle body, and nozzle strainer. The tip can be furnished in brass, aluminum, or stainless steel.

•

Gandy Applicator Booklets

The Gandy Co. Owatonna, Minn., is offering two descriptive folders on its Granular Chemical Row Crop Applicator and Hi-Lo Granular Chemical Applicator. Both applicators are equipped with gauges that insure accurate applications.

•

Closure Patent To Bemis

The Bemis Bro. Bag Co., St. Louis, Mo., has been granted U. S. Patent No. 2,855,881 for an acid-resistant bag closure sewn with thread manufactured in a combination of plies of synthetic plastic materials.

Bemis recommends that the thread be composed of Dacron and cotton plies, such as are produced at its cotton mill in Bemiston, Ala.

•

Cacodylic Acid Report

The Ansul Chemical Co., Marinette, Wisc., has prepared a folder on its Arsan brand cacodylic acid. The product is said to have a high level of phytotoxicity, while being relatively non-toxic to mammals. Its limited residual effects in the soil permit its use immediately prior to seeding without apparent effect on seed germination.

Cacodylic acid is known chemically as dimethylarsinic acid.

•

Geigy Diazinon Handbook

Geigy Agricultural Chemicals Division of Geigy Chemical Corp., Ardsley, N. Y., has prepared a 36-page handbook on Diazinon, its organic phosphate insecticide.

The use of Diazinon is outlined for fruits, vegetables, lawns and ornamentals, field crops, fly control, household insects, and animal pests.

•

Illinois Survey Booklet

The Illinois Natural History Survey, Urbana, Ill., has issued a 156-page history of the organization's 100 years of research activities.

Behind the CSC Controversy

The story behind the recent management change at Commercial Solvents Corp., in which Albert J. Woods resigned as president of the company, to be succeeded by Maynard C. Wheeler, told in an article in the May issue of *Fortune*. It runs under the title, "How Well-Bred Investors Overthrow a Management". The author is T. A. Wise.

Mr. Wise indicates that Jeremiah Milbank, Sr., and Jr., were the power at Commercial Solvents, through their control directly or through close friends of thirty per cent of the outstanding stock. They were dissatisfied with the earnings and general progress of the company under the executive direction of Mr. Woods who had served as president of CSC and chairman of the board's executive committee since Commercial Solvents hired him away from Wilson & Toomer Fertilizer Co. in 1950. Prior to that time Mr. Woods had built an outstanding career in the fertilizer business: as vice-president and director of Armour Fertilizer works, president of Chilean Nitrate Sales Corp., vice-president of W. R. Grace & Co., and president of Wilson & Toomer.

The *Fortune* article suggests that one factor in the decision of the Milbank group to replace Mr. Woods as operating head of the business was Commercial Solvents' unsuccessful attempt to bite off a major share of the fertilizer market in northwestern United States and Canada. CSC invested $2,700,000 for a 53% interest in Northwest Nitro-Chemicals Ltd., which operates a plant at Medicine Hat, Alberta. This, the *Fortune* article observes, "turned out to be a mistake, to the extent in $1,300,000 in losses so far."

In the agreement worked out for Mr. Woods' retirement, according to *Fortune*, he remains as a consultant to the company for four years at a salary of $50,000 annually, and thereafter at $20,600 a year for ten years. In addition, he is eligible for an annual pension of $9,000 a year, beginning in 1963.

•

Soil Fertility Projects

Intensified community soil fertility projects, initiated largely through the efforts of the National Plant Food Institute, are being carried out this year in 88 counties in 14 states across the United States. In 1958 the programs were carried on in Georgia and North Carolina. Pilot operations have been started in the 12 additional states this year.

Dr. Russell Coleman, executive vice president of the Institute, is of the opinion that the spread of soil fertility projects should be rapid in 1960 if the results of the 1959 tests are comparable to the pilot operations of 1958.

Among the new areas sponsoring soil fertility programs this year is Ionia County, Michigan.

•

NACA Slide Program

The National Agricultural Chemicals Association, Washington, D.C., has prepared a slide program on pesticide chemicals and their use. The program, titled "Pesticides—Boon to Mankind," is designed specifically for showing to men's and women's business and professional clubs, garden clubs, and similar organizations. It consists of 58 35 mm color slides and a printed script.

•

Authors of Caking Story

We're sorry to have omitted the name of the co-author of the article "Caking of Mixed Fertilizers and its Alleviation", which appeared in the March and April issues of *Agricultural Chemicals*.

This report was prepared by both Simon Kuczynski and Silverio Macchia.

ARSENATES · COPPERS · CAPTAN · RYANIA
METHOXYCHLOR · ROTENONE · MALATHION
CHLORANIL · DICHLONE · LINDANE · ENDRIN
ZINEB PYRAX® ABB DDT
BHC NABAM
HEPTACHLOR · TOXAPHENE · PYRETHRINS
PARATHION · FERBAM · ALDRIN · DIELDRIN
STREPTOMYCIN · SABADILLA · CHLORDANE

GOES WITH ALL TOXICANTS . . .

You need little or no stabilizer when formulating dusts with the newer pesticides when you use PYRAX ABB as the diluent.

The unusual combination of chemical inertness, neutral pH, dry flowability and low moisture content has made PYRAX ABB the logical choice for formulating the commonly used toxicants.

When you dilute any toxicant with PYRAX ABB, you reduce costs due to easier handling, better coverage, and simpler formulation.

The excellent compatibility of PYRAX ABB has made it the most widely used Pyrophyllite in the agricultural field.

Write today for compatibility data on PYRAX ABB and toxicants.

R. T. VANDERBILT CO., SPECIALTIES DEPARTMENT
230 Park Avenue, New York 17, N. Y.

( ) Please send Compatibility Data. State Application_____

Name_____

Title_____

(Please attach coupon to your Company letterhead) P - 9

M·S·A... everything for protection against today's farm chemicals

RESPIRATORS

M.S.A. FARM SPRAY RESPIRATOR

The *one* Respirator that protects against Parathion, EPN, Dieldrin, Aldrin, TEPP, HETP, OMPA, and Systox. This extra protection is the result of accepted new-type filters, which are interchangeable with in-use Farm Spray Respirators. Light weight; comfortable. Accepted by the U. S. Interdepartmental Committee on Pest Control. Write for details.

M.S.A. DUSTFOE RESPIRATOR

Ideal for breathing protection in fertilizer manufacturing. Sturdy; light weight; tops in worker acceptance. Effective filtering action against dusts not significantly more toxic than lead. Write for details.

GAS MASKS

M.S.A. GREENHOUSE MASK (GMC-1)—Safeguard against Parathion, HETP, TEPP, and other organic phosphates.

M.S.A. HYDROCYANIC ACID FUMIGANT MASK (GMK)—For use in heavy concentrations of hydrocyanic acid gases.

M.S.A. ORGANIC FUMIGANT MASK (GMA)—Protection against Methyl Bromide, etc.

M.S.A. ANHYDROUS AMMONIA MASK (GMD)—Safeguard against ammonia vapors. All masks are accepted by U. S. Interdepartmental Committee on Pest Control. Write for details.

PROTECTIVE CLOTHING GOGGLES—FIRST AID

Complete line of protective clothing from suits to hoods. Also goggles, faceshields, and first aid material including the M.S.A. Anhydrous Ammonia Kit.

MSA
SAFETY EQUIPMENT HEADQUARTERS

MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pa.

At Your Service: 82 Branch Offices in the U.S. and Canada

"HELLO . . . Woodward & Dickerson"
"BOM DIA . . . Woodward & Dickerson"
" . . . Woodward & Dickerson"
"DZIEŃ DOBRY . . . Woodward & Dickerson"
"BONJOUR . . . Woodward & Dickerson"
"BUENOS DIAS . . . Woodward & Dickerson"
"GOEDEN DAG . . . Woodward & Dickerson"
" . . . Woodward & Dickerson"
"GUTEN TAG . . . Woodward & Dickerson"
" . . . Woodward & Dickerson"
"BUON GIORNO . . . Woodward & Dickerson"
"GOD DAG . . . Woodward & Dickerson"
"ALOHA . . . Woodward & Dickerson"

ALL OVER THE WORLD, IN ANY LANGUAGE WOODWARD & DICKERSON IS WELL KNOWN FOR BUYING AND SELLING . . .

POTASH	*MURIATE* *SULPHATE* *NITRATE*
NITROGEN	*SULPHATE OF AMMONIA* *AMMONIUM NITRATE* *CALCIUM AMMONIUM NITRATE* *UREA*

AND ALL OTHER
FERTILIZER AND **FEED MATERIALS**

902

ESTABLISHED 1879
Woodward & Dickerson Inc.

1400 SOUTH PENN SQUARE, PHILADELPHIA 2, PA., U.S.A.

Telephone: LOcust 4-5600, Cable Address: "Woodward", Teletype: PH109

Branches in MADRID, MANILA, TOKYO, SEOUL, WASHINGTON, D.C., U.S.A.

WASHINGTON REPORT

(*From Page 74*)

sources, $170,000; and testing of chemicals, $65,000.

Obviously, turning a team of scientists, who have not had extensive experience with pesticides, into all these areas could create a degree of turmoil with which the Agricultural Chemicals Industry, the government, and the public could never catch up.

Informal comment heard here is that pesticide manufacturers might be wise to assemble and evaluate all sound research results now available in these various areas. Such information would make an impressive showing before Congress whenever public hearings are called for on the bill.

* * * * *

Smooth passage of a new bill to put nematocides, desiccants, defoliants and plant regulators under the Federal Insecticide, Fungicide, and Rodenticide Act is expected here in Washington.

The bill, introduced April 15, by Rep. Harold D. Cooley (D. N. C.) Chairman of the House Agriculture Committee, would automatically place these chemicals under provisions of the Miller Pesticide Residue Amendment to the Federal Food, Drug and Cosmetic Act.

* * * * *

Is a new approach toward eradication of pests evolving? Plans for a new drive against the gypsy moth in New York indicate that a piece-meal rather than an all-out massive attack may be emerging as the new pattern for pest eradication. This year's gypsy moth program will be small compared with the large scale effort two years ago, which ran around in a Federal Court trial. A new chemical will be used instead of DDT in some areas. While more expensive than DDT, the new material is safer for use in valleys and where dairying is a major factor.

USDA control officials, meanwhile, are pointing out that the fire ant eradication campaign is a piecemeal program. Large areas are not being blanketed with pesticides at one time. Instead, relatively small areas are covered, giving wildlife a chance to move to untreated areas until the treatments are over. Water sheds are being treated by hand or by ground equipment to protect fish and water supplies.

* * * * *

Home gardening appears to be on the threshhold of a boom. A key to what's in store comes not from population statistics, but from a program just launched by the National Association of Home Builders.

Aim of the program is to put on schools of landscape design open to home owners free of charge. The two-evening sessions will assist home owners bring individuality to their homes by means of landscaping.

School lectures will be illustrated with color slides and motion pictures, and amplified by distribution of reading materials on landscape design and related subjects. At a pilot "school program" in Washington, lectures included discussions of insect and pest control and fertilizer use.

* * * * *

Gardeners are buying an estimated $2,000,000,000 a year worth of garden tools, supplies, equipment, accessories, power units, and pesticides. Fertilizer and pesticide sales together now amount to a little less than $100,000,000. Chances are that strong promotion through such means as schools on landscape design, gardening kits to new home buyers, and other techniques total sales to the garden market can be significantly increased.

* * * * *

Here is some good news for chemical companies and advertising agencies that use photographs of aerial application. The National Aviation Trades Association, whose members include many aerial applicators, has built up a library of photos of aerial applications.

The photos are now available to chemical companies and advertising agencies on request to NATA, 1346 Connecticut Avenue, N. W., Washington 6, D. C. Idea behind the library is to end the use of photos showing outmoded equipment and improper application techniques.

NATA also is preparing to make a 35 mm color slide kit illustrating the operation of a typical aerial applicator for use in present-ink talks on aerial application to women's clubs and civic clubs. Plans are to develop a series of these kits to illustrate different aerial application operations.★★

•

New Growth Regulator

The U. S. Department of Agriculture recently reported on a new plant growth regulator, a phosphonium compound. (Full chemical name of the compound is 2,4-dichlorobenzyltributylphosphoni u m chloride.) The chemical shortens the stems but has no effect on blossoms or leaves if properly used, and is not a hazard to humans or animals, according to scientists of the Agricultural Research Service. Commercial manufacture of this chemical has started. Florists probably will be the first to use it, but later it is expected to be in retail stores for home gardeners. It shortens the stems of chrysanthemums, petunias, and some flowering shrubs as well as the lilies.

One method suggested for application is to mix the powdered phosphonium with the soil before planting the bulb or cutting. ARS scientists also say that the grower may drench the soil around the plant with a solution of the compound. At present, there is no way of spraying the chemical directly on the plant without causing white spots on the leaves. The scientists warn against treating partly grown plants. This causes the upper leaves to bunch up, making the plant appear top heavy. Further study is needed to show how long phosphonium in soil affects lilies or other plants grown in it.

JOHN S. MARK has been named manager of the Chemical Processing Division of the Farm Bureau Cooperative Association, Inc., Columbus, Ohio.

AC

W. G. SIMS INSECTICIDES CO., Greenwood, Miss., has been granted a charter of incorporation.

AC

INDIA expects to reach its chemical fertilizers production target of 380,000 tons by the end of 1961 or early 1962, according to that country's Washington embassy.

AC

SCIENCE PRODUCTS CO., Chicago, is offering small packages for home garden use of both Spergon Seed Protectant and Spergon Glad & Bulb Dust. Both products are manufactured by the Naugatuck Chemical Co., division of the U.S. Rubber Co.

AC

ROBERT A. ZAPF has been appointed manager of Quimicas Ortho De California, Ltd., California Spray-Chemical Corp.'s newly established subsidiary in San Jose, Costa Rica.

AC

SYDNEY T. ELLIS, formerly executive vice president of the Commercial Solvents Corp., has been elected president of Petro-Tex Chemical Corp., Houston, Tex. Petro-Tex is jointly owned by the Food Machinery & Chemical Corp. and the Tennessee Gas Transmission Co.

AC

MYRVEN H. CRON has been appointed a sales-service representative for the Houston area by the Southwestern Steel Container Co., Dallas, Texas.

AC

CLIMAX MOLYBDENUM, a division of American Metal Climax, Inc., Colo., has announced plans to introduce a new molybdenum fertilizer, called Moly-Gro this spring. According to company officials, tests have shown the fertilizer could boost the harvest of legume crops by as much as 125 million pounds annually.

GEORGE C. BOLLINGER, chief chemist at the American Agricultural Chemical Co.'s chemical control laboratory at Baltimore, Md., died on March 25, 1959. He was 48 years of age.

AC

RAVEL BROTHERS, Albuquerque, N.M., have announced plans to construct a $250,000 fertilizer and feed manufacturing plant on Broadway S.E. The firm has been there since 1930.

AC

JERRY G. WOODS, general manager of the chemical division of the Mississippi River Fuel Corp., St. Louis, Mo., died March 25 while on a vacation at Phoenix, Ariz. He was 47 years old.

AC

HERMAN RAMSBURG has been appointed director of farm research for the Dorchester Fertilizer Co., Cambridge, Md.

CORRECTING FACTORS

(*From Page 48*)

the metered liquid is expanded in the exchanger to cool the incoming anhydrous to prevent flashing prior to the pressure drop which occurs downstream from the meter.★★

PROMPT SERVICE

(*From Page 56*)

office and say his cabbage and tomatoes have not been sprayed for about two weeks and ask us to take a look at them. We immediately radio this information to a field car. The field man checks the fields and makes control recommendations to the grower. He might report that the tomatoes have a new hatch of small fruit worms and should be sprayed, but that the cabbage is clean except for heavy deposits of cabbage looper eggs which will not begin to hatch for several days and that we should make an application then to get the worms as they hatch out.

If the grower ok's the recommendations, the field man calls the office and orders three quarts of

Glendon Plant and Mines at Glendon, N. C.

the ideal diluent and extender for agricultural insecticides

INSECTICIDE GRADE

PYROPHYLLITE

- pH 6 to 7
- 92 to 95% will pass a 325 mesh screen
- Wt.—32#/cu. ft.
- Aver. particle size below 5 microns
- Chemically inert
- Non-alkaline

Dusts compounded with Glendon's Insecticide Grade Pyrophyllite will not absorb moisture, nor will the carrier separate from the active ingredients during storage. It holds well on plant leaves, even during rain, and when dusted from the air, settles rapidly, minimizing drift.

GLENDON DIVISION
CAROLINA PYROPHYLLITE COMPANY
P. O. Box 2414 GREENSBORO, N. C.

DDT to be applied to the tomatoes as soon as possible. The dispatcher passes this onto the man in charge of the loading rig and briefs the pilot on the location, crop, insect, and the material being used. The pilot checks the aerial photo of the field to note obstructions and hazards, and calls the field man to ask for a visual check of obstructions around the field. The field man, meanwhile, has instructed any field workers to leave the field when the airplane shows up. If he is not too busy he will stay in the area and flag the job, otherwise a flag man will be sent from the airport. In the fall and spring these jobs usually are completed within an hour after the grower calls.

Our pilots and loading crew report to the airport at 4 a.m. on a typical day during our busy season. The dispatcher already has scheduled work for the load crews and pilots are briefed for their first flights. All pilots, airplanes, and flagmen are ready for take off at daylight. The dispatcher then figures loading schedules for the next flights. As ships return from the first jobs, the dispatcher contacts all flag cars by radio and gives locations of the next jobs. This continues throughout the day and requires a great amount of coordinated effort between loading crews, pilots, and flag crews.

Our busiest season runs from May 1 through August 15. Our most important crop is cotton. Our fall, winter, and spring crops are tomatoes, lettuce, onions, peppers, cabbage, cantaloupes, citrus, and several others less important. Most of our work is with insecticides, but fungicide applications for the control of plant diseases keep us working in the fall and spring during wet periods. In addition, we plant seed for various feed and cover crops and apply some dry pelleted fertilizers. We also do a lot of cotton defoliation.

We carry a consigned stock of chemicals from all of our more prominent dealers and do not engage in the sale of chemicals. When an order comes in, the grower has the choice of supplying his own chemicals or having them billed to him from our stock by his dealer. We bill the grower for the application only.

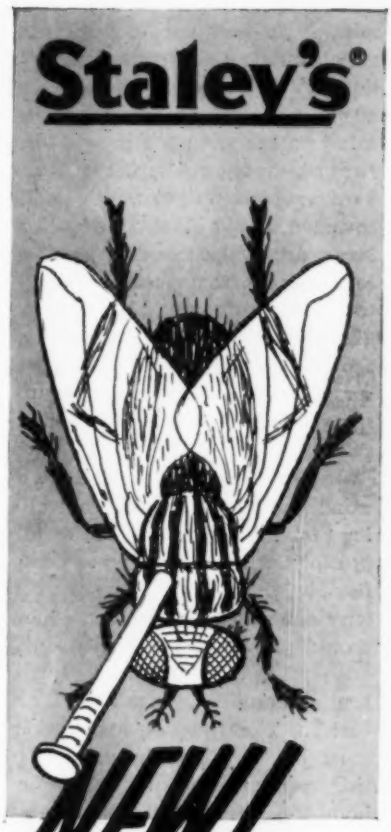
As to the future of aerial application, we feel that it is bright. Better chemicals are being developed to do more farm jobs and the farm labor situation promotes increased farm mechanization. Public opinion, furthermore, is starting to favor the agricultural airplane. A local banker, for instance, recently stated that the agricultural development in our area would have been impossible were it not for the airplane. Crop insects and plant disease could wipe out the crops each year, he warned, and the airplane is the only machine capable of covering the acreage fast enough to keep them under control.★★

ROADSIDE WEED CONTROL

(From Page 53)

grams we have urged two applications per year on roadsides and in fencerows. After that, one well timed application per year usually has been sufficient. For large-area spraying, one pound per acre in sufficient water to moisten the weeds thoroughly should be used. Spraying during hot, dry periods should be avoided, especially when roadside weeds are covered with dust. For fencerows and spot spraying, one gallon of four pounds of 2,4-D ester concentrate in 100 gallons of water, sprayed until plants are moist, has given good results. Treacherous areas, such as those near tomatoes and grapes, may be mowed, or else one of the contact herbicides, or even another translocated herbicide like Atlacide or Ammate, might be used.

On brush, we have used mixtures of 2,4-D and 2,4,5-T much more extensively than 2,4,5-T alone. Our standard mixture is one gallon of four pounds concentrate per 100 gallons of water, sprayed until brush is moist. Many applicators add a wetting agent to the spray



NEW! Staley's

P.I.B.* increases attractant power of insecticide sprays

*Staley's Protein Insecticide Baits

You've got to attract 'em before you can kill 'em! And no other attractant gets 'em like Staley's P.I.B.

Extensive tests with fruit flies and various other insects have proven beyond doubt that P.I.B. gives your spray better and surer kill efficiency at lower cost. Attractant properties hold for 2-3 weeks.

Get the facts on increasing the effectiveness of your sprays. For full details write to:

A. E. Staley Mfg. Co., Decatur, Ill.

Branch Offices: Atlanta • Boston
Chicago • Cleveland • Kansas City
New York • Philadelphia
San Francisco • St. Louis

solution at the rate of one pint of such commercial preprarations as liquid Vel or liquid Joy to every 50 gallons of spray solution. Warm, soft water from farm ponds, streams, or cisterns is better than hard water from deep wells. Good coverage should be obtained when leaves are well expanded, but before they become too old and tough. Pressure should be kept low (25 to 35 pounds) and nozzles should be close to the plant being sprayed. If possible, a follow-up spray should be used after the first year.

Basal treatments offer a wonderful opportunity for controlling unwanted small trees and brush. Such treatments are most feasible where small, isolated trees have established themselves. They should preferably be applied only on scattered or relatively small brush and on dry, warm days. The bark at the time of application must be dry if results are to be worthwhile. One quart of four pounds per gallon brush killer concentrate per five gallons of cheap fuel oil applied to basal 15 inches to runoff has given practically 100% control with one application.

Stump treatments are best when made before regrowth occurs, preferably at cutting time. Use the same concentration as for basal treatment and spray stumps when dry to runoff, concentrating on the bark. This method should be used for large trees where foliage and basal treatment would leave too much dead material. Removal followed by stump treatment leaves no objectionable dead material, enables grasses to close in quickly, and gives more satisfying results to all concerned.

Soil sterilants offer additional savings to authorities in charge of maintenance. Their wise use around bridge and culvert abutments, sign posts, poles, and under guard rails, adds both to safety and to appearance of the highways. Much more will be made of these materials in such areas, as well as in county and state storage yards, in the future. We have used Ureabor dry (one pound per 100 sq. ft.) very extensively, and also have had good results with Urox (one pound per 100 sq. ft.), Baron (one quart per square rod), Telvar (ten pounds per acre), and Simazine (ten pounds active per acre). We have found it best to apply these materials just as soon as the frost is out of the ground in the spring, or at least early in the season before any plant growth starts.

Brush and weed control on all roads will pay big dividends to everyone, control authorities and applicators as well as motorists. The distribution of available labor and equipment, and savings in time and expenditures, will be enhanced by careful planning of the program. Highway safety will be improved and county maintenance costs will go down. The agricultural applicator is in a position to improve the appearance and finances of his county and, at the same time, keep his equipment and crews busy.★★

Get Season Long Protection with

CHEM-BAM

The 100% Proven Effective Fungicide For Blight* Protection

Scientific proof from leading agricultural college at its vegetable research farm — plus on-the-spot farm tests have successfully demonstrated CHEM-BAM'S 100% protection for better quality crops and higher yields.
CHEM-BAM is used for vegetable disease prevention throughout the United States, Canada, Cuba and South America. It's the new, improved agricultural liquid spray with the exclusive U-101.

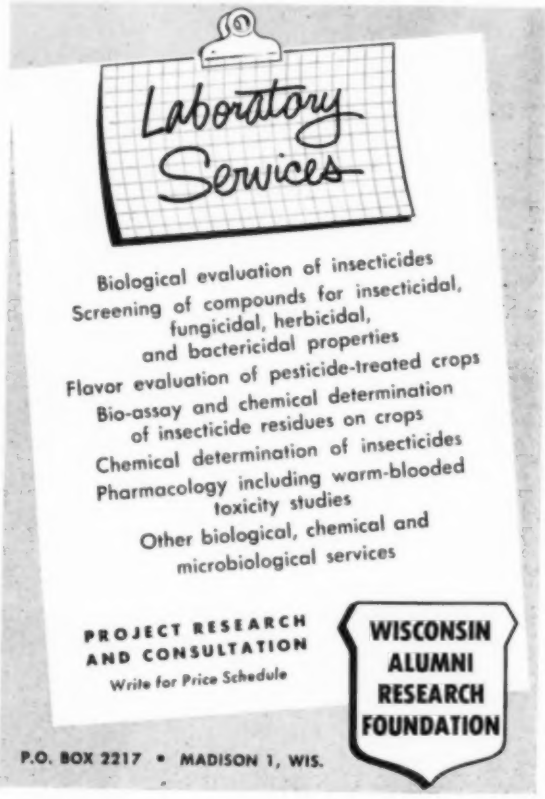
Check these features . . .

CHEM-BAM . . . the only fungicide that gives 100% protection against blight.
CHEM-BAM . . . can't damage plant tissues. Perfectly safe at all times.
CHEM-BAM . . . with exclusive U-101, sticks to plants through rain and repeated watering . . . can't wash off.
CHEM-BAM . . . insures full-size, healthier, luscious-looking vegetables.

*potato blight

For further and more complete details phone or write

CHEMICAL INSECTICIDE CORPORATION
30 Whitman Ave. • Metuchen, N. J. • Liberty 9-2300


Laboratory Services
Biological evaluation of insecticides
Screening of compounds for insecticidal, fungicidal, herbicidal, and bactericidal properties
Flavor evaluation of pesticide-treated crops
Bio-assay and chemical determination of insecticide residues on crops
Chemical determination of insecticides
Pharmacology including warm-blooded toxicity studies
Other biological, chemical and microbiological services
PROJECT RESEARCH AND CONSULTATION
Write for Price Schedule
WISCONSIN ALUMNI RESEARCH FOUNDATION
P.O. BOX 2217 • MADISON 1, WIS.

MICROBIAL CONTROL

(*From Page 37*)

among insects which have shown no indication of latent infections. Under certain conditions, however, the initiation of virus epizootics is probably connected with environmental stresses,—and the use of such stresses has been advocated for insect control.

There are several ways to apply pathogens for insect control: (1) applied alone as a dust, spray, or bait; (2) introduction and colonization into an insect population; (3) application in combination with insecticides, both compatibly and synergistically; and (4) application combined or coordinated with insect parasites, predators, and other microorganisms. Thus far, the first two methods have been used most frequently, and only a few attempts have been made in combination with insecticides, parasites, or other microganisms.

Most of the present-day conventional sprayers and dusters, mist blowers and aircraft have been found suitable for the application of insect pathogens, especially viruses and bacterial spores. Insect pathogens are usually applied in their resistant state or stage: the viruses within their inclusion bodies; bacteria, fungi, and protozoa as spores; and the nematodes in their resistant *dauer* stage. Nematodes and protozoa are apparently capable of withstanding the usual pressures of sprayers. The nonsporeforming bacterium, *Pseudomonas aeruginosa,* has been used against grasshoppers in sprays and baits together with a protectant.

The timing of spray applications is generally much more critical in the use of insect pathogens than in the use of insecticides, because of the relatively long period from infection to the death of the host,—and during this period the insect may continue to feed on the plants. Timing is generally critical in the application of viruses, but for the control of the Great Basin tent caterpillar, and the cabbage looper, timing of the virus may not be a limiting factor.

Timing, however, is not as critical with the use of certain bacteria, such as *Bacillus thuringiensis, B.sottox,* and their close relatives, which cause rapid death, within one to five days, and often quickly inhibit the feeding of the insects.

The detrimental effect of insecticidal and fungicidal spray residues on the entomogenous fungi of scale insects and mites has been investigated extensively in Florida. Wettable sulfur appears less harmful than lime sulfur and hydrated lime to *Myiophagus* sp. and *Hirsutella besseyi* Fisher, which parasitize purple scales. Acaricidal sulfur is unfavorable for a species of *Entomophthora* on the citrus red mite. Systox at a high concentration of 1 per cent has prevented the development of most soil micro-organisms, but at the concentrations (.1 to .001 per cent) used in the field, it may even have a stimulating effect for certain soil micro-organisms.

One researcher has found that the granulosis virus of the red banded leaf roller is unaffected by the fungicides, sulfur, ferbam, captan, dichlone and phenyl mercuric acetate; but glyodin has reduced the incidence of the disease. In field tests on the cabbage looper, the addition of TEPP to the polyhedrosis virus spray suspension seems to have no adverse affect on virus activity. Another investigator observes that insecticides have no unfavorable influence on the development of microsporidia within their hosts.

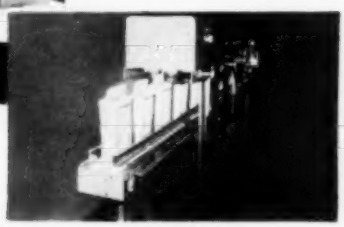
One of the promising areas of microbial control is the use of disease to increase the susceptibility of insects to insecticides.

Editors Note: The full report by Y. Tanada, reviews many other aspects of microbiological control, including a discussion of research on use of fungi, protozoa, nematodes and algae in pest control; the various methods of dispersal of pathogens; virulence; methods of application; persistence in the field; effect of physical environmental factors; compatibility with other biological control agents; and the population mortality factor. The reports includes a bibliography of some 225 references.

STRONG, SIFT-PROOF BAG CLOSURES!
for Automatic, Square or Flat Paper Bags

IDEAL FOR THESE PRODUCTS:
Insecticides, Fertilizers, Chemicals, Cement Paints, Wheat Paste, Milk Powder, Dog Foods, Briquets, Corn Meal, Powders and other granular products.

FRY MODEL CSG



EXIT VIEW

Sift-proof because it double-folds, heat seals and glues on heavyweight coated or lined paper bags. Double-folds and glues only on plain kraft bags. **Strong** because the second fold is glued to the first adding shipping and carrying strength to powder tightness. And the closing operation is continuously automatic!

WRITE FOR FREE BROCHURE TODAY!

GEORGE H. FRY COMPANY

42 East Second Street, Mineola, N. Y. — Ploneer 6-6230

FERTILIZER VIEWS

(*From Page 50*)

make the identical fertilizer on a production scale from batch to batch, or even continuously from day to day, because there will be some variability due to the process and to errors in weighing, sampling and so on. If a large number of small errors are all affecting the process independently, data from the process will be distributed in a manner that can be illustrated by a frequency curve. The most important of these curves is the normal bell-shaped curve. The importance of this curve lies in the fact that from two numbers, the mean and the standard deviation, we can establish the distribution of all the data. Standard deviation is usually taken as two or three sigmas. This means that if the process or chemical analysis gives results that fit a normal distribution curve, 95 per cent of the distribution will lie within the two sigmas limit, and there will be only a 5 per cent chance of a result falling outside this range. The three sigma number indicates that 99 per cent lie within its limits, and there is only a 1 per cent chance of results falling outside the range. In other words, any values falling outside the two sigma or three sigma limits can be attributed to some assignable cause, and not to the laws of probability. The one sigma limit embraces 68 per cent of the distribution.

Magruder Check Sample

Let us now briefly apply these concepts to the Magruder Check Fertilizer Sample report.

We use the standard deviation as the yardstick for judging whether a reported analysis should be considered a normal part of the large group of similar analyses or not. Limits of one sigma on each side of the mean or grand arithmetic average will include 68.3 per cent of the results reported by the laboratories.

Limits two sigmas away from the grand average will include an additional 27.1 per cent of the results, or a total of 95.4 per cent.

If we want to include the results from practically all the subscribing laboratories, the limits will have to be extended to three sigmas away from the grand average, or a total of 99.7 per cent of the results

If a result deviates considerably from the grand average, it indicates there is a bias or assignable cause. If a laboratory reports more than once a result approaching the three sigmas limit, it is safe to infer that the biased results are not due to chance, but to assignable causes in the laboratory, and should lead the supervisor to study his laboratory techniques for the source of bias.

An average result which deviates significantly from the grand average range indicates that the

MONTROSE DDVP

DIMETHYL DICHLORO VINYL PHOSPHATE, minimum 95% purity, is now being used in sugar-based fly baits and as a phoracide in mushroom culture. DDVP based emulsions concentrate has also been used for control of Cigarette Beetles in tobacco warehouses. Because of its high insect toxicity in very low concentrations, and its relatively low toxicity to warm blooded animals and lack of residue, experimental work is suggested in many fields of application.
DDVP is now being supplied in commercial quantities for authorized uses and in experimental quantities to qualified experimenters.

MONTROSE DET

DIETHYL TOLUAMIDE, the "most" successful wide-spectrum insect repellent developed by the U.S.D.A. and Army Quartermaster Corps.
Montrose DET is guaranteed to contain 95% minimum meta isomer, the most effective isomer as shown by field tests. DET aerosol lotion and spray formulations have been successfully marketed for the past two years. Montrose DET is available for prompt shipment from stock.

Manufactured by

MONTROSE CHEMICAL COMPANY
104-112 Lister Avenue Newark 5, New Jersey

Sales Agents

R. W. GREEFF & CO., INC.
10 Rockefeller Plaza, New York 20, N. Y.
1721 Tribune Tower, Chicago 11, Illinois

AGRICULTURAL CHEMICALS

offers practical features on manufacturing processes, market information, merchandising aids, survey data, and technical and toxicological data on agricultural chemicals. Also included are monthly features by industry experts on topics of current interest, reviews of technical literature, new industry products, equipment, and bulletins and news about the agricultural chemicals industry.

CLIP AND MAIL TO

AGRICULTURAL CHEMICALS, P.O. Box 31, Caldwell, N. J.

Please enter subscription(s) as follows:
(Check or money order enclosed)

☐ One year, $3.00 (Canada $4.00; Foreign $9.00)
☐ Two years, $5.00 (Canada $7.00; Foreign $15.00)

NAME .....
(Please Print)

FIRM .....

STREET .....

CITY .....

laboratory should improve its precision or reproducibility first instead of looking for bias.

References: The reader is referred to numerous text books on the subject if he wants to study statistical techniques.★★

AMMONIATION RATES

(*From Page 43*)

b. Thorough mixing in a fairly dense bed in order to provide intimate contact between the reactants.
c. Sufficient reaction time in the ammoniator.
d. Adequate temperature control.
e. Proper ventilation.

3. Proper selection and maintenance of the equipment, auxiliary to the ammoniator, such as,
a. All metering equipment should be kept in good working condition, free of dust and corrosion.
b. Use of corrosion-resistant distributors for both ammonia and acid, properly located. If acid is used in the formulation, the complete neutralization of the acid with ammonia is desirable in order to prevent the acid from reacting with any ammonium nitrate or potassium chloride present, thus avoiding the formation of nitric or hydrochloric acids. These acids are very corrosive and cause large stack losses.
4. Adequate drying facilities with proper controls. a.) The amount of water-soluble materials in the final product determines the moisture level to which the material must be dried. The maximum allowable moisture usually is about 4% and frequently is less than 2%. Excessive moisture can cause caking and/or reversion of the phosphate to an unavailable form. b.) High drying temperatures can result in high nitrogen losses.
5. Cooling facilities.
The product should generally be cooled to 100°F-125°F in order to minimize phosphate reversion and ammonia losses.
6. Avoid use of materials in the formulations that may bring about secondary heating in the curing piles, such as calcium carbonate, limestone, magnesium sulfate, potassium carbonate, other alkaline materials, and in some cases dolomite. These materials in certain formulations can result in phosphate reversions and ammonia losses.

In conclusion, it can be stated that due to various limitations, the ammoniation rates, expressed as pounds of ammonia per unit of available P_2O_5, for phosphatic materials are commonly regarded in commercial operations to be 5-6 pounds for normal superphosphate, 3-4 pounds for triple superphosphate, 6.5-7.5 pounds for "wet process" phosphoric acid and 7.5-8.5 pounds for "furnace" phosphoric acid. Many plants are able to operate at the upper limits of these ranges or even at slightly higher rates, through proper maintenance of the various controls and through close surveillance of their operations. With the improvements that are being made in equipment, technological "know-how," and raw materials, it is conceivable that the ammoniation rates presently employed will be increased appreciably in the future as they have been in the past.★★

References

1. Keenan, F. G., Reactions Occurring during Ammoniation of Superphosphates, Ind. Eng. Chem. 22, 1378-82 (1930)
2. White, L. M. Hardesty, J. O., and Ross, W. H., Ammoniation of Double Superphosphate, Ind. Eng. Chem. 27, 562-7 (1935).
3. Yates, L. D., Nielsson, F. T., and Hicks, G. C., TVA, Continuous Ammoniator, Farm Chemicals 117, No. 7, 38-48; No. 8, 34-41 (1954).
4. Kumagai, R., Rapp, H. F., and Hardesty, J. O., Physical Factors Influencing Ammonia Absorption by Superphosphates, Agr. Food Chem. 2, 25-30 (1954).
5. Hignett, Better Nitrogen Recovery, Farm Chemicals, June, 41, 42, 44, 46, 48 (1958).
6. Proceedings of the Fertilizer Industry Round Table, 1957.

RUGGED

Raymond
MULTIWALL
BAGS
serve Farm Needs

Raymond Bag Corporation
Middletown, Ohio
A Division of
Albemarle Paper Mfg. Co.

District Offices:
New York • Chicago • Kansas City
Baltimore

FOR YOUR LIBRARY

Handbook of Insecticide Dust Diluents and Carriers
A new and completely revised edition containing commercial information as well as research data on the subject. ..... $ 4.75

Handbook of Agricultural Pest Control
S. F. Bailey and L. M. Smith
A comprehensive review of all phases of pest control including aerial application and tables and formulas 3.25

Concentrated Spray Equipment, Mixtures and Application Methods
S. F. Potts
A thorough and up-to-date coverage of this relatively new concept in the application of agricultural chemicals. 12.50

The Care & Feeding of Garden Plants 3.25
Chemical Insect Attractants & Repellents 6.00
Chemistry & Action of Insecticides 8.25
Chemistry & Toxicology of Insecticides 4.00
Chemistry of Plants 5.00
Chemistry of the Pesticides 9.25
Commercial Fertilizers, Their Sources & Use 8.25
Cotton Growing Problems 9.75
Destructive & Useful Insects Their Habits & Control 12.75
Diseases of the Fruit Crops 8.75
Handbook of Pest Control 9.25
Industrial Chemistry 7.50
Insect Control by Chemicals 15.00
Insect Resistance in Crop Plants 9.80
Pesticide Handbook 1.00
Pesticides 9.00
Plant Design & Economics for Chemical Engineers 11.25
Plant Regulators in Agriculture 5.75
Principles of Agricultural Chemistry, Volumes I & II 9.50
Principles of Fungicidal Action 6.75
Soils & Fertilizer 6.75
Soil Plant Relationships 7.00
Soils & Soil Fertility 6.75
Vegetable Crops 8.75
Weed Control 8.25

Send check with order to
AGRICULTURAL CHEMICALS
Caldwell, N. J.

AGRICULTURAL CHEMICALS
P.O. Box 31, Caldwell, N. J.

Please send the following books .....

We enclose $.....

Name .....

Address .....

City ..... State .....

ELDON F. LOATS has been appointed to the newly-created post of resident manager in the Hawaiian Islands for the American Cyanamid Co.'s Agricultural Division. His headquarters are on the island of Oahu.

LIQUID FERTILIZERS

(*From Page* 41)

(32°F.). The development of a new process to produce superphosphoric acid opens the way to higher analyses in the future. Dry mixed fertilizers are now offered with total nutrient contents above 50 per cent. This advantage in higher analysis is somewhat offset by the ease of moving liquids by pumping.

Condition problems (salting out of liquid fertilizers and caking of dry forms) are rapidly being overcome.

Minor Element Content

Liquid fertilizers carry less minor elements than dry mixed fertilizers, because high purity furnace acid that is low in trace elements is used. This is not considered to be significant, since deficiencies are so uncommon and, where present, would not be effectively corrected by the minor elements that naturally occur in dry fertilizers.

Yield results in several states have usually shown small differences that have not consistently favored either liquid or dry fertilizers when the same amounts of nutrients were applied. Illinois initiated experiments comparing liquid and dry fertilizers at three locations in 1958.★★

LISTENING POST

(*From Page* 71)

from Panogen 15 at other rates of application. In the second planting (fall of 1956), residual fungicidal activity was evident only in the plots treated with Anticarie at 20 pounds pere acre. Infection was 3 per cent in these plots as compared with 57 per cent in the

untreated check plots of this planting. In the third planting (fall of 1957), no treatment showed any remaining fungicidal effectiveness.

In the second series (treated once, inoculated and planted twice), Anticarie and Terraclor at all rates and Panogen 15 at the 1:10 dilution rate again provided good control in the first planting (fall of 1956). Control was best in plots treated with Anticarie or Terraclor at the two higher rates (5 and 20 pounds per acre) of application. In the second planting (fall of 1957), no treatment resulted in a significant reduction in amount of bunt as compared with the check.

In the third series (treated at time of planting, fall of 1957) Anticarie at 5 and 20 pounds and Terraclor at 20 pounds per acre, and Panogen 15 at the 1:10 dilution rate, all gave good control.

Under the conditions of these experiments, the effectiveness of Terraclor and Panogen 15 at all three rates tested, and of Anticarie at 2½ and 5 pounds per acre, lasted less than 6 months. Anticarie at 20 pounds per acre remained active for more than 6 months, but not as long as 12 months.

Dr. Purdy concludes that where resistant varieties do not give sufficient protection against loss from bunt, practical and economic control could be accomplished by the application of proper amounts of Anticarie or Terraclor to the soil at time of seeding. However, although bunt would be controlled in the first crop, succeeding crops would not receive any significant benefit from a single application.★★

EMULSIFIERS

(*From Page* 42)

out and better control of pine. However, there are several disadvantages to an oil program.

In many out of the way places, it is unconvenient to carry in the extra oil. Added oil is harder to emulsify, and a larger percentage of resprouting of brush is likely to occur. Also, oil and the labor of handling is expensive. It would be ideal if an emulsifiable concentrate could be designed which would be as effective as an herbicide plus oil, but without having to add any oil.

"Forron" promises to fulfill these requirements. It has been under test for several years, and many spray applicators have had a chance to evaluate it. Brown-out is obtained with "Forron" just as fast as with brush killer plus oil. Brush control is in many cases better than an oil program. No oil needs to be hauled into out of the way places because "Forron" is designed for use without added oil. Homogeneous spray solutions are easily obtained from "Forron", thus reducing the concern a spray operator needs to give to his sprayer agitation requirements.

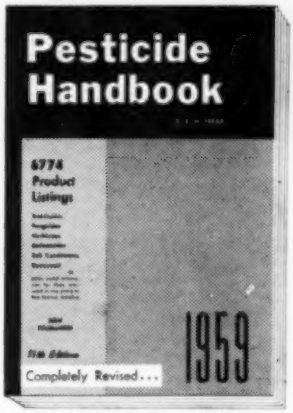
"Forron" contains an "extender" specially developed by The Dow Chemical Company. This extender causes the herbicide to penetrate foliage and translocate into the stem better than an herbicide plus oil. Brush control results look exceedingly good with "Forron".

In this article we have tried to review some of the fundamentals of herbicide emulsification. We have reviewed the components of a formulation and how a formulation is made to emulsify. We have reviewed some of the problems that one encounters in emulsifying added oil to herbicides. We have reviewed how spray drift can virtually be eliminated through the use of invert emulsions. We have mentioned how a specially designed emulsifiable concentrate will have the effect of oil without the use of oil. There is more and more research being done by many companies to make herbicidal emulsions handle and perform more effectively. This is not the end, this is a continued story.★★

Now Reporting on

7041

TRADE NAMES



COMPLETELY REVISED

UP-TO-THE MINUTE

1959 Edition

AN IMPORTANT BOOK FOR THOSE INTERESTED IN ANY PHASE OF PEST CONTROL

County agents, extension and research specialists, manufacturers, salesmen, jobbers, dealers, purchasing agents, health officers, farmers and librarians have found this publication to be extremely useful time and time again. *Pesticide Handbook* is the ONLY book giving complete up-to-the-minute information on over 7,000 commercial products, completely indexed by trade names, active ingredients and manufacturers.

at your fingertips—

You'll find a wealth of information on fungicides, insecticides, rodenticides, adjuvants, diluents, compatibilities, antidotes, pest control equipment. New tolerances are listed.

about the editor —

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1959, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State University.

Over 250 Pages

$1.75

Cloth Bound Edition ..... ea. $3.25

Postage included on prepaid orders

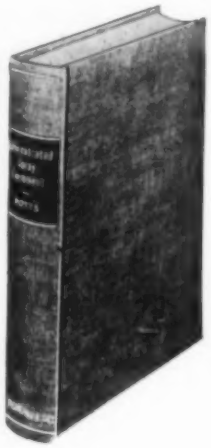
Send Today

PESTICIDE HANDBOOK

P. O. BOX 798

STATE COLLEGE, PENNSYLVANIA

For the Applicator, the Formulator:



CONCENTRATED SPRAY EQUIPMENT

Mixtures and Application Methods

by

Samuel Frederick Potts

NOW AVAILABLE

650 Pages

$12.50 in U S A
$13.50 elsewhere

Contents

Fundamentals of Application
Ground Spray Equipment
Aerial Equipment
Control of Weeds and Woody Plants
Mixtures • Aerosols • Terminology

This book provides a thorough and up-to-date coverage of concentrated sprays, a relatively new concept in the application of agricultural chemicals. It will meet the requirements of custom applicators, growers, foresters, municipalities, etc.

The broad field of concentrated spray application has grown rapidly over the past few years so that today several times as many acres now are treated with concentrated spray as with conventional spraying and dusting. As a result many types of hand, ground, and aerial equipment have been developed for the application of myriad spray formulations and combinations. This book brings together and clarifies the fundamentals and potentialities of this whole subject.

Samuel Frederick Potts, author of this new book, has been in the agricultural chemicals industry for more than 30 years. He has published more than 70 articles, booklets, etc., on various phases of the industry. He has also been instrumental in designing new equipment and improvements in equipment for the application of agricultural chemicals.

Send Check With Order

DORLAND BOOKS
P. O. Box 31
Caldwell, N. J.

Enclosed is our check for $12.50 (Foreign and Canada $13.50) covering a copy of **CONCENTRATED SPRAY EQUIPMENT.** It is understood that we may return the book in ten days for full refund.

Name .....

Address .....

City, State .....

CLASSIFIED ADVERTISING

Rates for classified advertisement are ten cents per word, $2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, $1.00 minimum. *Check must accompany all classified advertisements.* Address all replies to Classified Advertisements with Box Number care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

Situations Wanted:

SALESMAN. B. S. degree—General agriculture. Five years experience fertilizer sales North Eastern U. S. Desires agricultural sales position within same area with progressive concern. Address Box 223, c/o **Agricultural Chemicals.**

SALES or SALES MANAGEMENT. Have briefcase, will travel. Entomologist, over eight years experience in agricultural chemicals sales management. Rocky Mountain and Pacific Northwest areas. Address Box 224, c/o **Agricultural Chemicals.**

AGRONOMIST, M.S. Age 35, single, extensive experience in domestic, foreign and tropical agricultural field. Desires responsible position with progressive concern. International, technical liaison, sales position preferred. Address Box 226, c/o **Agricultural Chemicals.**

AGRONOMIST (Ph.D. Soil Fertility) Broad background in research, extension and teaching. Available for summer employment. Will travel. Address Box 225, c/o **Agricultural Chemicals.**

Miscellaneous:

KILL BRUSH at low cost with amazing R-H "Brush Rhap." Will not injure grasses, grains, cattle or other animals. See your dealer or write Reasor-Hill Corporation, Box 36AC, Jacksonville, Ark.

KILL submerged water weeds which foul up motor propellers, tangle fishing gear and choke irrigation ditches with R-H Granular Weed Rhap. Inexpensive, easy to use, sure results. For details write Reasor-Hill Corporation Box 36AC, Jacksonville, Ark.

KILL BITTER WEEDS, wild onions and dog fennel with R-H Weed Rhap at low cost. Will not injure grasses, grains, cattle or other animals. Call your dealer, or write Reasor-Hill Corporation, Box 36AC, Jacksonville, Ark.

For Sale:

SALE: Horizontal Aluminum Tank 4,000 gallons. Steam Tube Dryers (Tubes Removable) 6′ x 50′, 6′ x 25′, 4′ x 30′. Also Mixers, Bucket Elevators, Screw Conveyor, Hammermills, Pulverizers, etc. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

FOR SALE: Rotary Dryers 6′ x 50′; 5′6″ x 50′; 5′ x 30′; Ribbon Mixers 40 & 90 & 225 cu. ft.; Rotex & Tyler Screens single and double deck; Mikro Pulverizers; Raymond Mills; etc. Send us your inquiries. Brill Equipment Co., 2411 Third Ave., New York 51, N. Y.

ZONOLITE VERMICULITE —a free-flowing, highly absorptive, inorganic, lightweight carrier for any type chemical. Low density. Cuts carrier costs. Formulates without caking or balling up. Technical information and assistance to help you work out new formulae on confidential basis. Also working samples, prices. Dependable service and supply from over 40 ideally located Zonolite plants.
ZONOLITE COMPANY, Industrial Div.
Dept. AC-59, 135 S. LaSalle St., Chicago 3, Ill.

Now Available
1958 Proceedings
FERTILIZER INDUSTRY ROUND TABLE
PRICE $3.00
Proceedings of the 1958 Fertilizer Industry Round Table meeting are now available. Complete reports covering some 150 fertilizer production problems are included in the 116 page booklet.
Send check with order to:
H. L. MARSHALL
1604 Walterswood Road
Baltimore, Md.

PROFESSIONAL DIRECTORY

SOIL & PLANT TESTS
SOIL FERTILITY PROBLEMS
EVALUATION OF AGRICULTURAL CHEMICALS
Dr. Wolf's Agricultural Laboratories
2620 Taylor St. Hollywood, Fla.

— COMPLETE —
LABORATORY SERVICE
Small and Large Animal Research
Toxicity Tests, Human Patch Tests.
Bacteriology—Screening, Testing.
Research—Bactericides, Fungicides
Chemistry—Visible, Ultraviolet, Infrared Spectroscopy, Chromatography.
New Products. Pilot Plant.
Write for Brochure.
SCIENTIFIC ASSOCIATES
3755 FOREST PARK AVE.
ST. LOUIS 8, MO. JE. 1-5922

Chemical & Engineering Analyses, Research & Development
Agricultural Chemical Analyses.
Insecticides, Fungicides, Herbicides, Rodenticides, Fertilizers.
Toxicology. Market Research.
Product Development.
Ask for complete details: call — WAtkins 4-5800 or write to:
SNELL **Foster D. Snell, Inc.**
29 W. 15th STREET
New York 11, N. Y.

FLORIDA FIELD TRIALS
Evaluations
of
Agricultural Chemicals.
DR. G. R. TOWNSEND
Box 356
Belle Glade, Florida

Sperling Laboratories
Toxicology — Pharmacology
Physiology
Soil Analysis
Frederick Sperling, Ph.D
Formerly Pharmacologist-in-Charge
Pharmacological and Rodenticide Laboratory
U. S. Department of Agriculture
6815 N. 24th St. Arlington 13, Va.

Theodore Riedeburg Associates
Sales Consultants
and
Manufacturers' Representatives
on
Agricultural Chemicals
415 Lexington Ave.
New York 17, New York
MUrray Hill 7-1488

LESS COVERAGE NEEDED ON KLM

THE WORLD OVER
KLM
ROYAL DUTCH AIRLINES

Reduce crating — and save money several ways — when you airfreight via KLM. Your cargo needs less protection because of KLM's efficient ground handling, skilled loading, frequent flights. This cuts crating costs, weight charges, insurance and customs fees. Remember, because KLM cargo men are career men, KLM air cargo is never out of expert hands.

KLM flies direct from New York City, Houston, Miami and Montreal to points the world over.

KLM Royal Dutch Airlines, 430 Park Avenue, New York 22, New York

INDEX to ADVERTISERS

Allied Chemical Corporation—
General Chemical Div. 60
Allied Chemical Corporation—
Nitrogen Division ..... 18A to 18D
American Agricultural Chemical Co. ..... Apr.
American Cyanamid Co. 30, 57
American Potash & Chemical Corp. ..... Apr.
Amoco Chemicals Corp. ..... Apr.
Ashcraft-Wilkinson Co. 10

Bagpak Div., International
Paper Co. ..... Feb.
Baughman Manufacturing Company .... Apr.
Bemis Bros. Bag Co. ..... March
Bradley Pulverizer Co. 7

Call Air 56
Chase Bag Co. ..... Apr.
Chemagro Corp. 62
Chemical Construction Corp. ..... March
Chemical Insecticide Corp. 100
Clark Equipment Co. 84
R. D. Cole Mfg. Co. ..... March
Combustion Engineering, Inc.,
Raymond Division 25
Commercial Solvents Corp. ..... March
Cox, Dr. Alvin ..... March

Davies Nitrate Co. ..... March
Davison Chemical Co., Division of
W. R. Grace & Co. ..... March
De Bardeleben Marine Corp. ..... Apr.
Diamond Alkali Co. 12, 64
Dorr-Oliver Co. ..... Apr.
Duval Sulphur & Potash Co. 10

Eastern States Petroleum &
Chemical Corp. 14
Eastman Chemical Products, Inc. ..... March
Emulsol Chemical Corp. ..... 2nd Cover
Escambia Chemical Corp. ..... Apr.

Fairfield Chemical Div., Food
Machinery & Chemical Co. ..... 4th Cover
Finco, Inc. 63
Fischer & Porter Co. 13
Flexo Products, Inc. 74
Floridin Co. ..... Apr.
Flag Sulphur Co. ..... Apr.
Frontier Chemical Co. ..... March
Fry Co., Geo. H. 101

Geigy Agricultural Chemicals 72, 73
General Chemical Div., Allied
Chemical Corp. 60
General Reduction Company 88
Glendon Pyrophyllite Co. 98
Glenn Chemical Corp. ..... Apr.
Grand River Chemical Div.,
Deere & Co. ..... March
Greeff & Co., R. W. 102
Grumman Aircraft Engineering Corp. 52

Hercules Powder Co. 20
Highway Equipment Co. ..... Apr.
Hi-Shear Rivet Tool Co. 58
Hooker Chemical Corp. 82
Huber, J. M. Corp. ..... Apr.
Hudson Pulp & Paper Co. 17

International Minerals & Chemical
Corp. ..... 75 to 78

Johns-Manville Co. 19

Kellett Aircraft Corp. ..... Apr.
Kennedy Van Saun Mfg. & Eng. Corp. ..... Apr.
KLM Royal Dutch Airlines 108
Kolker Chemical Corp. ..... Feb.
Kraft Bag Co. 9

Magnet Cove Barium Co. ..... Apr.
Miller Chemical & Fertilizer Corp. ..... Apr.
Mine Safety Appliances Co. 96

Nationwide Chemical Co. ..... Apr.
Niagara Chemical Div., Food Machinery
& Chemical Corp. ..... Apr.
Nitrogen Division-Allied Chemical
Corp. ..... 18A to 18D

Pennsalt of Washington, Div.
Pennsalt Chemicals Corp. ..... Apr.
Phelps Dodge Refining Corp. 11
Penick Co., S. B. 4
Phillips Chemical Co. ..... Apr.
Piper Aircraft Corp. ..... Apr.
Potash Company of America 3
Prentiss Drug & Chemical Co. ..... Apr.

Raymond Bag Co. 103
Raymond Division, Combustion
Engineering, Inc. 25
Reideburg, Theodore Associates 107
Renneburg & Sons Co., Edw. 92
Republic Steel Corp. ..... Apr.
Rohm & Haas Co. 23

Scientific Associates, Inc. 107
Shell Chemical Corp. ..... March
Snell, Foster D., Inc. 107
Southeastern Clay Co. ..... Apr.
Sohio Chemical Co. 15
Southwestern Engineering Co. ..... Apr.
Southwest Potash Corp. 26
Spencer Chemical Co. 28, 29
Sperling Laboratories 107
Spraying Systems Inc. 74
Staley Manufacturing Co., A. E. 99
Standard Agricultural Chemicals, Inc. .... Apr.
Standard Oil Co. (Indiana) ..... Apr.
Stauffer Chemical Co. 61
Stepan Chemical Co. ..... 3rd Cover
St. Regis Paper Co. ..... Apr.
Sturtevant Mill Corp. 94
Swift & Co. 27

Tennessee Corp. 18
Texas Co. ..... Apr.
Texas Gulf Sulphur Co. ..... Apr.
Thos. Alabama Kaolin Co. 86
Townsend, Dr. G. R. 107
Transland Aircraft 58

Union Bag-Camp Paper Co. 24
United-Heckathorn 90
U. S. Industrial Chemical Co. 49
U. S. Phosphoric Products, Div.
Tennessee Corp. 16, 21
U. S. Potash Co. 6

Vanderbilt Co., R. T. 95
Velsicol Chemical Corp. ..... Apr.
Victor Chemical Corp. 67, 68

West Virginia Pulp & Paper Co. 22
Wilson & Geo. Meyer Co. ..... Dec.
Wisconsin Alumni Research
Foundation 100
Witco Chemical Co. ..... 2nd Cover
Dr. Wolf's Agricultural Labs. 107
Woodward & Dickerson, Inc. 96

TALE ENDS

IT looks as if the reported proposal out in California to require licensing of pesticide salesmen is a dead issue for the moment. At a meeting in Sacramento at which pesticide producers, agricultural applicators and enforcement officials were all represented, it seemed to be the concensus of opinion that the answer to the problems which exist lies in the direction of further education rather than in legislative or regulatory action.

A committee has been named to set up the proposed educational campaign, and before the 1960 season opens a determined effort will be made to reach farmers, pesticide salesmen, etc., with information which will aid them in intelligent and efficient use of pesticides.

AC

Monument to the "Klamath Weed Beetle" erected in Humboldt County, Calif. by the Cattlemen's Association, the Woolgrowers Association and the Farm Bureau. It celebrates the role of "Chrysolina germellata," a beetle introduced from France, in eradicating Klamath Weed from California range land. Joint credit for the successful effort is given to Dr. Harry S. Smith, University of California, farm advisor Douglas Pine and Dr. A. W. Sampson. Larval stages of the beetle feed during the overwintering period on basal growth of the weed, and the beetles have shown a surprising ability to find and destroy isolated weed plants. Through introduction of the beetles infestations of Klamath Weed have been brought under control in all areas of the state, with substantial economic gains.

AC

Demand for the National Plant Food Institute's new "Fertilizer Salesman's Handbook" has been so strong, NPFI reports it has gone into a second printing. The entire first printing of 5,000 copies has been sold and half of the second printing of 10,000 copies contracted for since January of this year.

The second printing of the handbook is available in a deluxe edition for $2.00 per copy as well as the standard edition at $1.50 per copy. The deluxe edition has a metal instead of a plastic binder. Metal binders are available separately for 50 cents each.

AC

A special promotion this season to stimulate sale of Dixco Gro-Magic fertilizer featured Philadelphia model Grace Curry, shown below hefting one of the easy-carry, 50-lb. bags of the product. The manufacturer is the I. P. Thomas Division of Dixon Chemical Industries, Inc., Merchantville, N. J. Robert McCormick, sales manager for the Thomas division, set up the campaign which featured autographed photos of Miss Curry carrying her bag of plant food.

A TYPICAL AGRICULTURAL CHEMICALS SUBSCRIBER SAYS

"We read Agricultural Chemicals

H. J. KOCH
African Explosives & Chemical Industries, Ltd.
Johannesburg, South Africa

because . . .

. . . it is a valuable source of information to our fertilizer staff. Agricultural Chemicals is received by personnel in all five centers of our company and is considered to be a very useful publication. As Technical Advisor (Fertilizers), I am responsible for all technical aspects of the production of fertilizers at our four factories. Keeping abreast of technical developments in the rest of the world is an important aspect of my duties. Without Agricultural Chemicals, it would be very hard for me to do this."

African Explosives & Chemical Industries, Ltd., operates four fertilizer factories in South Africa. The company can produce more than one million tons of single superphosphate, containing 19 per cent water soluble P_2O_5; 150,000 tons of ammonia; and 120,000 tons of urea each year. The company has a granulating capacity of more than 400,000 tons per year and recently has installed mechanical bagging and loading equipment to insure quality control and accuracy of weights. Mr. Koch is Technical Advisor—Fertilizers for the company.

— Leader in the Field —

AGRICULTURAL CHEMICALS

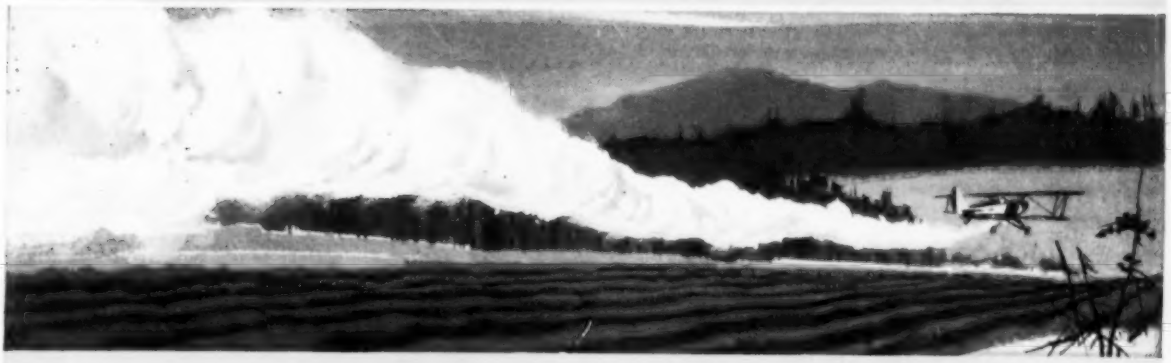
CALDWELL **NEW JERSEY**

Member Audit Bureau of Circulations

New matched emulsifiers

toximul a AND b

Top Performance at new low cost



Here's a brand new emulsifier team . . . more effective than ever over a wide range of chlorinated insecticides. Best of all, Toximul A and Toximul B offer new low price, outstanding flash dispersion, excellent clarity, uniformity, and stability.

Check this complete line-up of Toximul Emulsifiers

FOR CHLORINATED INSECTICIDES. New Toximul A and B . . . the new emulsifier team of outstanding performance . . . low price.

GENERAL PURPOSE EMULSIFIERS. Toximul 500 or 600 . . . the widely-used, easy-to-use emulsifiers for Chlordane, DDT, toxaphene, weed killers, etc.

FOR HERBICIDES and CHLORINATED INSECTICIDES. Toximul 102 and 103, another high efficiency Toximul emulsifier team for *both* herbicides and chlorinated insecticides.

FOR PHOSPHATE INSECTICIDES. A complete emulsifier line-up, including **Toximul MP** for Malathion. **Toximul P** for Parathion. **Toximul Q** for Methyl Parathion.

STEPAN CHEMICAL COMPANY

NINOL

427 West Randolph Street, Chicago 6, Illinois

Telephone: STate 2-4711

Warehouse Stocks: Jersey City • Philadelphia • Chicago • Atlanta
St. Louis • Dallas • Los Angeles • San Francisco • Portland • Tampa
In Canada: Natural Products, Ltd. • Montreal

AMERICA'S MOST COMPLETE LINE OF SURFACTANTS

Stepan Chemical Company
427 West Randolph Street, Chicago 6, Illinois AC-5

Gentlemen:

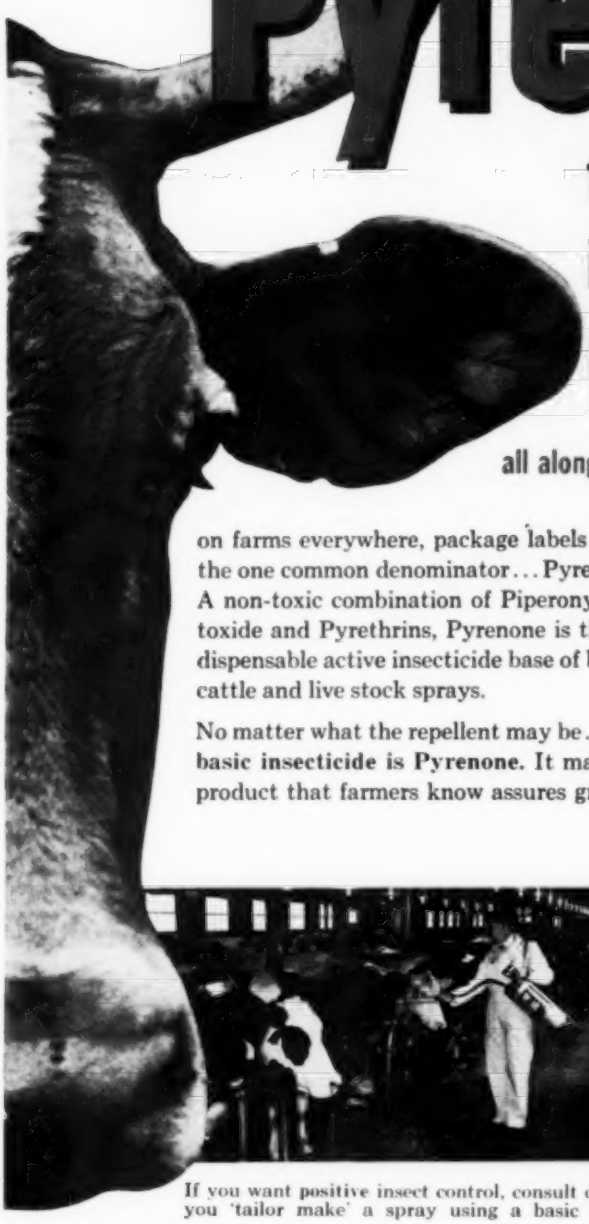
Send complete information and sample on items checked.

☐ Toximul A and B ☐ Toximul MP
☐ Toximul 102 and 103 ☐ Toximul Q
☐ Toximul 500 ☐ Toximul 600 ☐ Toximul P

Name .....
Firm .....
Address .....
City ..... Zone ..... State .....

Pyrenone*

the common denominator in all effective live stock sprays



all along the milk routes of the world...

on farms everywhere, package labels carry the one common denominator... Pyrenone! A non-toxic combination of Piperonyl Butoxide and Pyrethrins, Pyrenone is the indispensable active insecticide base of better cattle and live stock sprays.

No matter what the repellent may be... **the basic insecticide is Pyrenone.** It marks a product that farmers know assures greater effectiveness... high knockdown and kill, under difficult conditions, including resistant insects.

Closely linked in effectiveness is Technical Piperonyl Butoxide, the best synergist available. Always found in conjunction with Pyrethrins, it is another widely used Fairfield Chemical research development.

** Reg. U.S. Pat. Off., FMC.*

If you want positive insect control, consult or write your nearest Fairfield representative. We will help you 'tailor make' a spray using a basic Pyrenone formulation to fit your specific requirements.

Putting Ideas to Work

FOOD MACHINERY AND CHEMICAL CORPORATION

Fairfield Chemicals

Sales Headquarters

441 LEXINGTON AVENUE, NEW YORK 17, N.Y.

Branches in Principal Cities. In Canada: Natural Products Corp., Montreal and Toronto.